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The SIXTY-FIFTH ANNUAL REPORT of the Board of Water Commissioners of the City of Detroit

For the Year Ending
June 30th, 1917

President, ROBERT OAKMAN

SIXTY-FIFTH ANNUAL REPORT

OF THE

BOARD *of* WATER COMMISSIONERS

OF THE CITY OF DETROIT

TO THE

COMMON COUNCIL *of* THE CITY *of* DETROIT

TOGETHER WITH THE REPORTS OF
THE OFFICERS OF THE BOARD

FOR THE YEAR ENDING
JUNE 30, 1917

DETROIT
THOS. SMITH PRESS
1918

BOARD OF WATER COMMISSIONERS
OF THE CITY OF DETROIT

MEMBERS

ROBERT OAKMAN, 1918
EMIL STROH, 1920
BENJ. F. GUINEY, 1919
ALEX. DOW, 1921
JOHN B. SOSNOWSKI, 1922

COMMITTEES

Ways and Means	Commissioners STROH and SOSNOWSKI
Extension and Construction	Commissioners SOSNOWSKI and DOW
Water Works Park	Commissioners DOW and GUINEY
Supplies	Commissioners GUINEY and STROH

The President is ex-officio member of each committee.

OFFICERS

President	ROBERT OAKMAN
Vice-President	BENJ. F. GUINEY
Secretary	H. A. GILMARTIN
General Superintendent	THEODORE A. LEISEN
Purchasing Agent and Paymaster	H. S. STARKEY
Auditor	J. W. LOEFFLER
Chief Engineer at Pumping Station	HARRY W. GOULD
Bookkeeper	GEORGE BARRIE
Cashier	D. C. GROBBEL
Permit Clerk	LOUIS MONTGOMERY
Chief Clerk, Rate Department	WALTER C. BOWEN
Chief Clerk, Meter Department	CHAS. F. GILMER

BOARD OF WATER COMMISSIONERS OF THE CITY OF DETROIT

METER RATES

Payable Quarterly

	Quarterly
First 1,000 cubic feet per quarter, minimum charge	**1 00**
Next 3,000 cubic feet	**50 cts. per M.**
All additional	**30 cts. per M.**
Double rates outside of city.	

Assessment Rates

	Per Annum
For family, household purposes, each family	**$4 00**
Private stable, for each horse	**1 20**
Livery stable, for each horse	**1 20**
Dray and team horses, each	**1 00**
Cows, each	**1 00**
Boarding houses, in addition to family rate, each boarder or rommer	**50**
Estimated quantities of water, each 1,000 gallons	**07**
Automobiles, each	**1 20**
Bath tub, for families, each	**1 00**
Bath tub, public, each tub	**4 00**
Automatic water closets, for family, 1st closet	**2 00**
Automatic water closets, each additional	**60**
Rod water closets, not less than	**8 00**
Urinals, not less than	**2 00**
Wash hand basin, for family, each	**50**
Wash hand basin, for other purposes, each person	**15**
Hose bibb or connection, premises 30 feet front or less	**1 00**
Hose bibb or connection, premises 30 feet to 60 feet—	**1 40**
Hose bibb or connection, premises 60 feet to 100 feet	**2 00**
Special rates for larger grounds.	
Fountains	**$10 00 to 20 00**
Street sprinklers, each wagon	**50 00**

WATER RATES for BUILDING and CONSTRUCTION PURPOSES

Brick	**5c** per M.
Plaster	**7c** per 100 Sq. Yds.
Concrete	**$1.00** per 100 Cu. Yds.
Concrete 6″ thick or less	**20c** per 100 Sq. Yds.
Tile	**5c** per 100 Cu. Ft.
Each perch stone	**1c**

	No Basement	Complete Basement
One story frame	**$ 50**	**$ 75**
Two story frame	**75**	**1 00**
One story brick	**75**	**1 00**
Two story brick	**1 00**	**1 25**
Two family frame	**1 00**	**1 50**
Two family brick	**1 50**	**2 00**

Where there is a waste of water an increase of rates will be made.

ANNUAL REPORT
THE BOARD OF WATER COMMISSIONERS
OF THE CITY OF DETROIT

July 1, 1916 to June 30, 1917

TO THE HONORABLE
The Common Council of the City of Detroit.

Gentlemen:—

The Board of Water Commissioners of the City of Detroit respectfully presents its annual report for the fiscal year ending June 30, 1917.

The total receipts for the year were $1,984,486.04 and the total disbursements were $2,140,146.49. The total pumpage for the year was 52,040,254,250 gallons, an increase of 11½% over that of the previous year. The average daily consumption of water was 142,756,000 gallons, equal to a daily per capita consumption of 165 gallons, based on a population of 861,427 inhabitants for the City of Detroit and the environs supplied.

During the year 70 miles of new water mains were completed. The work of metering all service connections has been going forward steadily during the year, and on June 30, 1917, there were 65,542 meters in service.

During the past year, an experimental filtration plant with a capacity of 200,000 gallons per day, was constructed and is now in successful operation. The results so far obtained lead to the belief that filtration will satisfactorily deal with the problems of turbidity and bacterial reduction.

Report in detail of the work performed during the year follows:

Respectfully submitted,

ROBERT OAKMAN,
BENJ. F. GUINEY,
EMIL STROH,
ALEX DOW,
JOHN B. SOSNOWSKI,
Commissioners.

FINANCIAL STATEMENT

July 1, 1916			
Cash on hand			$ 5,076.34
Cash in Bank—			
General Fund		$292,953.60	
Outstanding Checks		39,457.65	
			253,495.95
Sinking Fund			100,115.58
Hurlbut Fund			1,536.82
Secretary Fund		$ 923.00	
Outstanding Checks		127.65	
		795.65	
Cash on Hand		204.35	
			1,000.00
			$ 361,224.69
Receipts for year ending June 30, 1917			1,984,486.04
			$2,345,710.73
Disbursements for year ending June 30, 1917			2,140,146.49
Balance—			
Cash on hand		$ 4,949.63	
Cash in Bank—			
General Fund	$ 88,168.00		
Outstanding Checks	1,172.65		
		$ 86,995.35	
Sinking Fund		106,172.58	
Hurlbut Fund		6,446.68	
Secretary Fund	210.94		
Outstanding Checks	16.00		
	194.94		
Cash on Hand	805.06		
		1,000.00	
			$ 205,564.24

FIRST AND OLD DETROIT NATIONAL BANK

BOARD OF WATER COMMISSIONERS,
Detroit, Mich.

Gentlemen:—

This is to advise you that the balance standing to the credit of the following accounts as shown on our books at the close of business June 30th, 1917, was as follows:

Secretary Fund	$ 210.94
Sinking Fund	106,172.58
General Fund	88,168.00
Hurlburt Fund	6,446.68

Yours very truly,

W. E. WINCKLER,
Auditor.

Cost of Water Service Operations for the Year Ending June 30th, 1917

Pumped per Meters at Pumping Station, 52,040,254,000 gals.

			Per Million Gallons
PRODUCTION COST			
Collection and Purification System:			
Chemical treatment	$ 20,682.96		
Maintenance of collection and purification plant	852.72		
Depreciation of collection and purification plant	7.859.20		
Direct cost of collection and purification plant		$ 29,394.88	$0.56
Steam Power Cost:			
Fuel for pumping	$ 88,766.88		
Wages of firemen and helpers	37,786.95		
Boiler house supplies and expense	24.73		
Maintenance of power plant and buildings	4,346.49		
Depreciation of power plant and buildings	8,068.44		
Direct steam power cost		138,993.49	2.67
Cost of Operating Pumps:			
Wages of assistant engineers and helpsers	$ 40,409.85		
Oils, waste and supplies	4,160.67		
Maintenance of pumping plant and buildings	2,345.19		
Depreciation of pumping plant and buildings	28,416.32		
Direct cost of operating pumps		75,332.03	1.45
Superintendence and general expense		3,699.15	.07
Proportion of Overhead Expense:			
Proportion of engineering department expense	$ 5,946.03		
Proportion of administration and general expense	256.51		
Total proportion of overhead expense		6,202.54	.12
Total cost of water delivered to mains		$ 253,622.09	$4.87
DISTRIBUTION COST			
Distribution System Cost:			
Repairing main leaks	$ 6,837.18		
Repair and maintain gates and wells	4,667.64		
Flush mains and blow off dead ends	2,423.11		
Repair trenches, walks and lawns	4,604.47		
Depreciation of pipe lines	121,919.75		
Depreciation of emergency station	209.80		
Direct distribution cost		$ 140,661.95	$2.70

Service Cost:			
Repairing service leaks	$ 2,558.03		
Repair and maintain drinking fountains	1,822.95		
False reports of leaks	420.09		
No water and short supply	1,214.47		
Shut-off and let-on	371.26		
Miscellaneous inspection	1,042.60		
Direct service cost		7,429.40	.11
Total direct distribution cost		$ 148,091.35	$2.84
Proportion of Overhead Expense:			
Proportion of storage yard expense	$ 19,685.77		
Proportion of engineering department expense	6,317.65		
Proportion of administration and general expense	39,341.16		
Total proportion of overhead expense		65,344.58	1.26
Total distribution costs		$ 213,435.93	$4.10

METER SERVICE COSTS

Meter Department Cost:			
Repair and maintain meters	$ 12,889.06		
Remove and replace meters	3,989.10		
Depreciation of meters	5,414.08		
Direct meter cost		22,292.24	
Proportion of overhead expense:			
Proportion of storage yard expense	$ 5,581.00		
Proportion of administration and general expense	70,188.27		
Total proportion of overhead expense		75,769.27	
Total meter service costs		$ 98,061.51	$1.88

SUMMARY

Total cost of water delivered to mains	$ 253,622.09	
Total distribution cost	213,435.93	
Total cost of water pumped and delivered	$ 467,058.02	
Total meter cost	98,061.51	
Total cost	$565,119.53	$10.85

CONSTRUCTION REPORT

Year Ending June 30th, 1917

Work in Process June 30, 1916		$ 504,773.13
Pay Rolls	$ 287,133.00	
Materials	1,108,167.81	
Cartage	30,777.95	$1,426,078.78
Overhead Expense—		
Storage Yard Expense	67,640.12	
Engineering Dept. Expense	24,898.99	
Administration and General Expense	9,149.63	$ 101,688.74
		$2,032,540.65
Complete Work Transferred to Plant Accounts—		
Water Mains, Gates and Wells	648,407.50	
Collection and Purification Plant	23,282.61	
Water Works Park Improvement	5,759.55	
Pumping Plant, No. 2	4,679.86	
Power Plant	342.53	
Miscellaneous	1,907.61	$ 684,379.66
Work in Process June 30, 1917		$1,348,160.99

NET REVENUES

Year Ending June 30th, 1917

Water Service Operations—		
Assessment Rates	$ 520,432.76	
Meter rates	1,025,932.82	
Shutting off and letting on	382.75	
Percentages on delinquent accounts	9,178.70	
Total revenue from water service	1,555,927.03	
Cost of water service operations	565,119.53	
Net gain from water service operations		$ 990,807.50
Miscellaneous Revenue—		
Estimates paid for pipe lines	65,906.83	
Sale of service connection construction	5,036.19	
Bonuses for pipe laid on petition	67,752.90	
Meter Bonuses	10,943.84	
Miscellaneous receipts	4,411.86	
Interest earned on General Fund	11,718.04	
Interest earned on sinking fund	3,714.50	
Plumbers license	1,214.50	
Sale of work and material	13,110.74	
		$ 183,809.40
		$1,174,616.90
City of Detroit general tax levy	$ 75,000.00	
Interest on bonded indebtedness	72,845.00	
		$ 2,155.00
Income from the Trustees of the Hurlbut fund		$ 4,909.86
		$1,181,681.76
Water Works Park expense	$ 24,544.97	
Expenses guarding pumping station	12,049.52	
		$ 56,594.49
Net gain for year ending June 30, 1917		$1,145,087.27

BALANCE SHEET

Year Ending June 30th, 1917

ASSETS

Current Cash and Bank Accounts:	
Current cash	$ 4,949.63
Cash in Bank:	
General Fund	86,995.35
Hurlbut Fund	6,446.68
Secretary's Fund, bank balance and cash on hand	1,000.00
	$ 99,391.66
Accounts Receivable:	
Meter rates	$ 87,530.35
Assessments rates	4,717.01
Miscellaneous	5,359.69
Total accounts receivable	$ 97,607.05
Inventories:	
Stores and supplies at yard	$ 223,591.13
Coal at pumping station	2,579.75
Construction work in process	1,348,160.99
Equipment	176,139.63
Total inventories	$ 1,750,471.50
Plants:	
Collection and purification plant	$ 578,430.49
Steam power plant	297,842.48
Pumping plant No. 1	1,016,705.23
Pumping plant No. 2	1,005,715.99
Water mains, gates and wells	12,146,219.10
Meters in service	577,705.30
Public drinking fountains	8,981.45
Storage yard buildings and improvements	84,759.38
Emergency station	15,723.91
Main office building	54,288.00
Water Works Park improvements	159,103.67
	$15,945,475.00
Less reserve for depreciation	2,491,100.73
Total value of plants	$13,454,374.27
Real Estate	866.929.18
Sinking Fund	106.172.58
Total	$16,374,946.24

LIABILITIES, ETC.

Current Liabilities:	
Vouchers payable	$ 247,281.12
Interest accrued on bonds	23,198.47
1917-18 assessment	4,546.15
Accrued pay roll	4,239.84
Loan from 1st & Old Detroit National Bank	100,000.00
Unclaimed pay roll money	93.99
	$ 379,359.57
Special Liabilities:	
Liability to injured workmen	$ 3,715.24
Bonded indebtedness	$ 1,947,000.00
Reserve:	
Sinking Fund	$ 106,172.58
Hurlbut Fund	6,446.68
	$ 112,619.26
Surplus	$13,932,252.17
	$16,374,946.24

BONDED INDEBTEDNESS

The following table shows the dates of issue and amount of bonds of this department outstanding at this date. The total amount issued by the Board during its existence is $3,990,000, of which $300,000 were refunded and $1,743,000 redeemed, leaving a balance due of $1,947,000.

				Rate of Int.	Redeemed Refund	Outstanding
1873	Jan. 10, 1895	Jan. 10, 1925	$ 100,000	4%		$ 100,000
1869	Feb. 1, 1900	Feb. 1, 1930	200,000	3½%	$ 20,000	180,000
1873	Jan. 1, 1903	Jan. 1, 1933	50,000	3½%		50,000
1873	Sept. 1, 1903	Sept. 1, 1933	150,000	3½%		150,000
1901	June 1, 1904	June 1, 1934	200,000	3½%		200,000
1901	Aug. 1, 1904	Aug. 1, 1919	100,000	4%		100,000
1901	Feb. 1, 1905	Feb. 1, 1935	150,000	3½%		150,000
1901	Aug. 1, 1908	Aug. 1, 1938	250,000	3½%	75,000	175,000
1901	July 1, 1909	July 1, 1939	200,000	3½%	98,000	102,000
1901	Oct. 1, 1912	Oct. 1, 1932	240,000	4%		240,000
1913	Mar. 1, 1914	Mar. 1, 1944	500,000	4%		500,000
			$2,140,000		$193,000	$1,947,000

REPORT OF THE GENERAL SUPERINTENDENT

TO THE BOARD OF WATER COMMISSIONERS OF THE CITY OF DETROIT.

Gentlemen:—In conformity with established custom, I submit herewith the Annual Report of the Engineering, Construction and Operating Departments for the fiscal year ending June 30, 1917, embracing in a general brief review the results of work carried out by these branches of the service, including tabulated statements of certain results, and more detailed information regarding the pumpage of water and of work on the distribution system.

PUMPAGE AND DISTRIBUTION.

All of the statements of water pumpage or consumption, are based on the records of the venturi meters, representing approximately three (3%) per cent less than the quantity determined by plunger displacement, which covers all losses due to pump slippage and all water used in and about the pumping stations which does not pass through the venturi meters.

The total pumpage for the current fiscal year amounted to 52,040,254,250 gallons, of which 38,275,113,750 gallons was distributed through the low service system, and 13,765,140,500 gallons through the high service. The total pumpage for the year shows an increase of eleven and one-half (11½%) per cent over the records of the previous year, as compared with an estimated increase of ten and one-quarter (10¼%) per cent in the population supplied.

The average daily consumption for the entire system was 142,576,039 gallons; equivalent to a per capita consumption of 165 gallons per diem, based on an estimated population of 861,427 inhabitants for the City of Detroit and the environs supplied.

The rapidly increasing number of meters being installed should have an appreciable effect in the next few years in reducing the per capita consumption. The number of metered services was increased from 46,991 in 1916 to 65,542 in 1917, a net increase of 18,551 and the total quantity furnished through metered services was 29,509,010,557 gallons, or 56.7 per cent of the total consumption, and produced 66.3 per cent of the revenue derived from the sale of water.

The quantity of water utilized by the manufacturing plants, railroads, hotels and other business enterprises, which may be classified as industrial consumption, is estimated approximately at 18,000,000,000 gallons, or about 35% of the total consumption. The remaining quantity amounting to 34,000,000,000 gallons which may be designated as domestic consumption, includes all water used by residences, and for flushing and sprinkling streets, fire protection and incidental leakage and other unaccounted for quantities. This domestic consumption was equivalent to a daily per capita consumption of slightly over 100 gallons.

The maximum hourly rate of consumption occurred on July 26, 1916, attaining an equivalent daily consumption of 221,400,000 gallons, or 55 per cent above the average for the year. The minimum hourly rate occurred on December 4, 1916, and was equivalent to a daily consumption of 79,320,000 gallons.

Reports from the Fire Department for the year indicate a total consumption of 30,664,000 gallons for fire protection service, amounting to one seventeenth of one per cent of the total quantity pumped.

The following tables show the maximum and minimum figures and various other details of pumpage, both as measured by meters, and indicated by plunger displacement, including statement of quantities on both high and low service, by months and for the entire year.

COMPARISON OF METER AND PUMP RECORDS

	Meter Measurement	Plunger Displacement
Maximum day, Feb. 13, 1917	188,920,250	194,566,250
Minimum day, Dec. 3, 1916	106,993,500	109,925,300
Average daily (entire system)	142,576,039	147,462,090
Average daily (high service)	37,712,714	47,942,937
Average daily (low service)	104,863,325	99,519,153
Total for year	52,040,254,250	53,823,662,830
Maximum hour (entire system), July 26, 1916, 7:00 P. M. to 8:00 P. M	9,225,000	10,241,050
Maximum hour (high service)	2,925,000	3,408,910
Maximum hour (low service)	6,300,000	6,832,140
Minimum hour (entire system), Dec. 4, 1916, 3:00 A. M. to 4:00 A. M	3,305,000	3,410,280
Minimum hour (high service)	735,000	850,400
Minimum hour (low service)	2,570,000	2,559,880

Rate per day at maximum hour (entire system)	221,400,000	245,785,200
Rate per day at maximum hour (high service)	70,200,000	81,813,840
Rate per day at maximum hour (low service)	151,200,000	163,971,360
Rate per day at minimum hour (entire system)	79,320,000	81,846,720
Rate per day at minimum hour (high service)	17,640,000	20,409,600
Rate per day at minimum hour (low service)	61,680,000	61,437,120

PUMPAGE

Recorded by Venturi Meters

	HIGH SERVICE		LOW SERVICE		TOTAL	
Month 1916	Total Gallons	Daily Average Gallons	Total Gallons	Daily Average Gallons	Total Gallons	Daily Average Gallons
July	1,370,358,000	44,205,097	3,625,623,000	116,955,581	4,995,981,000	161,160,677
August	1,315,982,500	42,451,046	3,565,155,000	115,005,000	4,881,137,500	157,456,048
Sept.	1,170,177,500	39,005,917	3,247,965,750	108,265,525	4,418,143,250	147,271,442
Oct.	1,128,380,000	36,399,355	3,111,475,000	100,370,161	4,239,855,000	136,769,516
Nov.	1,010,262,500	33,675,417	2,814,766,000	93,825,533	3,825,028,500	127,500,950
Dec.	1,076,980,000	34,741,290	3,057,089,000	98,615,774	4,134,069,000	133,357,064
1917						
Jan.	1,167,845,000	37,672,419	3,306,830,750	106,671,960	4,474,675,750	144,344,379
Feb.	1,160,755,000	41,455,536	3,348,899,000	119,603,536	4,509,654,000	161,059,072
March	1,122,982,500	36,225,242	3,239,746,500	104,507,951	4,362,729,000	140,733,193
April	1,031,137,500	34,371,250	2,923,441,750	97,448,058	3,954,579,250	131,819,308
May	1,072,340,000	34,591,613	3,056,329,000	98,591,258	4,128,669,000	133,182,871
June	1,137,940,000	37,931,333	2,977,793,000	99,259,767	4,115,733,000	137,191,100
Year	13,765,140,500	37,712,714	38,275,113,750	104,863,325	52,040,254,250	142,576,039

The tabulation below shows the division of the water consumption and population in Detroit and the adjacent suburbs.

CONSUMPTION OF WATER IN DETROIT AND VILLAGES

	Total Consumption Gallons	Daily Average Gallons	Estimated Population
Detroit, unmetered	20,578,401,850	56,379,183	....
Detroit, metered	29,209,010,600	80,024,687	....
Detroit, total	49,787,412,450	136,403,870	808,327
River Rouge, metered	344,542,300	943,951	7,500
Ecorse, metered	86,475,500	236,919	2,700
Hamtramck, metered	1,405,494,200	3,850,669	30,500
Oakwood, metered	76,310,200	209,069	1,500
Grosse Pointe, metered	40,019,500	109,642	900
Greenfield, St. Clair Heights, etc.	300,000,000	819,672	10,000
Villages, total	2,252,841,800	6,172,169	53,100
Detroit, total	49,787,412,450	136,403,870	808,327
Total	52,040,254,250	142,576,039	861,427

Total, unmetered	20,878,401,850	57,201,101	....
Total, metered	31,161,852,400	85,374,938	....
Total pumpage	52,040,254,250	142,576,039	....

The pumping station records show an average station duty of 99,600,000 foot-pounds per 100 lbs. of coal consumed for all pumping engines, where all steam used for heating surrounding buildings, and on auxiliary engines used in construction and repair work near the station, is charged up against pumpage—an average of 953 gallons of water was pumped per pound of coal.

The actual cost of operating the pumping stations (exclusive of interest and depreciation) and the average cost per million gallons, is shown by the accompanying tabulations:

Cost of Pumpage

	Total Cost	Cost per Million Gallons	Cost per Million Gallons Raised 100 ft.
Labor	$ 81,895.95	$1.57	$1.26
Fuel	88,766.88	1.71	1.36
Oil and Supplies	4,185.40	.08	.06
Miscellaneous	6,691.68	.13	.10
Total	$181,539.91	$3.49	$2.78

The increased cost of fuel due to the abnormal conditions of the coal market during a portion of the year covered by this report is responsible for the increased cost as compared with the years immediately preceding.

QUALITY OF WATER

The character of both the river and the treated water has been remarkably good during current year, the bacterial counts and the positive tests of B. Coli both having been considerably below the records of previous years. The only treatment given to the water was by means of chlorination, the quantity of liquid chlorin used averaging about two pounds per million gallons of water treated; equivalent to one quarter of one part of chlorin per million parts of water.

The river water averaged 27 bacteria per c. c. on agar at 37 degrees, and confirmed evidence of B. Coli in 63 out of 589 samples of 1 c. c. and 866 out of 2945 samples of 10 c. c.

The treated water showed an average of seven bacteria per c. c. on agar at thirty-seven degrees, and confirmed evidence of B. Coli in only 16 out of 2945 samples of 10 c. c. and no positive indication in any of 589 tests of 1 c. c. samples. The cost of the chlorination treatment was approximately 40 cents per million gallons.

Daily bacterial analyses of River Water and Treated Water show the following results:

Average number of Bacteria per c. c.:

Gelatin at 20 deg.	River Water, 60.2;	Treated Water 9.6
Agar at 37 deg.	River Water, 27.6;	Treated Water 7.5
Agar at 20 deg.	River Water, 61.6;	Treated Water 9.2

RIVER WATER—

B. Coli in 1 C. C. sample—positive on 53 days—63 times in 589 tests.
B. Coli in 10 C. C. samples—positive on 172 days—866 times in 2945 tests.

TREATED WATER—

B. Coli in 1 C. C. sample—positive on 0 days— 0 times in 589 tests.
B. Coli in 10 C. C. samples—positive on 14 days—16 times in 2945 tests.

The accompanying Table "E" shows the monthly average results of bacterial analyses of the river water, treated water and tap water, and the turbidities in parts per million.

WATER PRESSURE

The average mean pressures maintained throughout the city were practically the same as for the preceding year, and resulted in very satisfactory service, and a more uniform pressure was kept up as indicated by the fact that the average of the extreme low pressures was greater than for the previous year, although the consumption was considerably greater. This result was due to the constantly increasing number of mains of large sizes.

A detailed statement of the pressures recorded at the several pressure stations throughout the city, is shown in the accompanying "Table of Pressures."

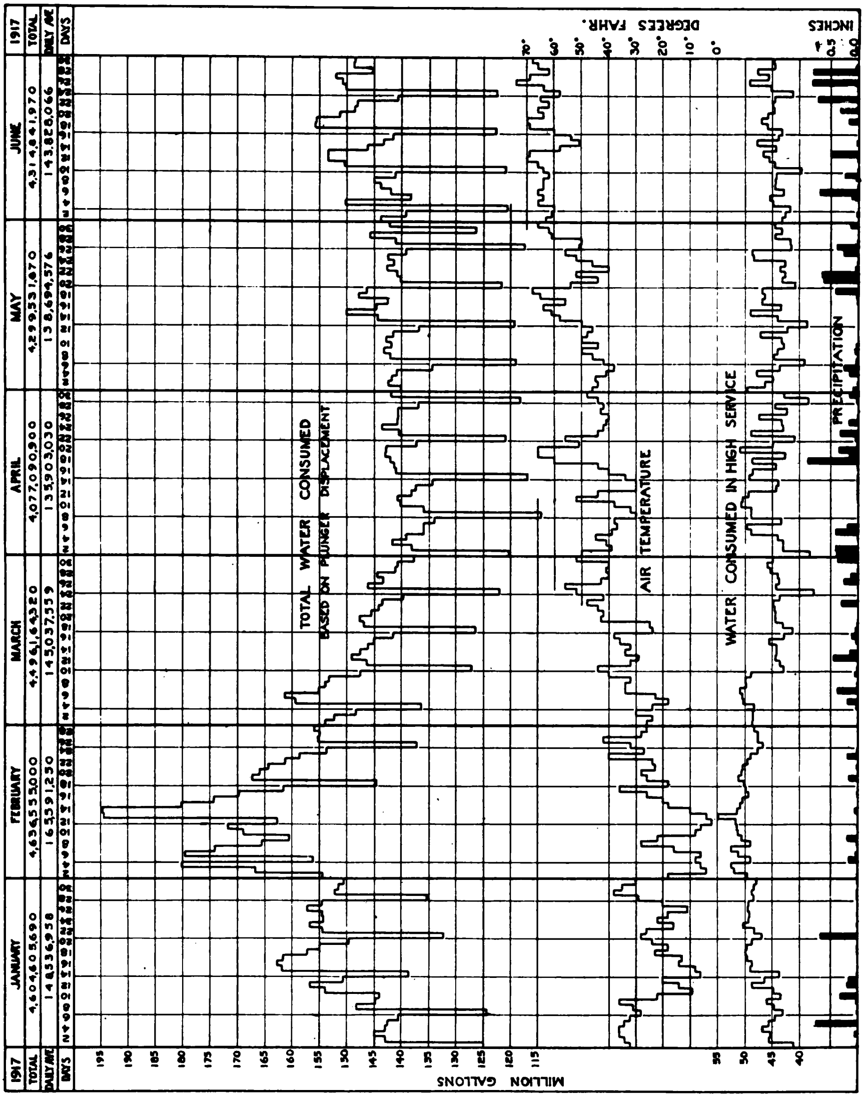
BACTERIAL ANALYSIS DETROIT WATER

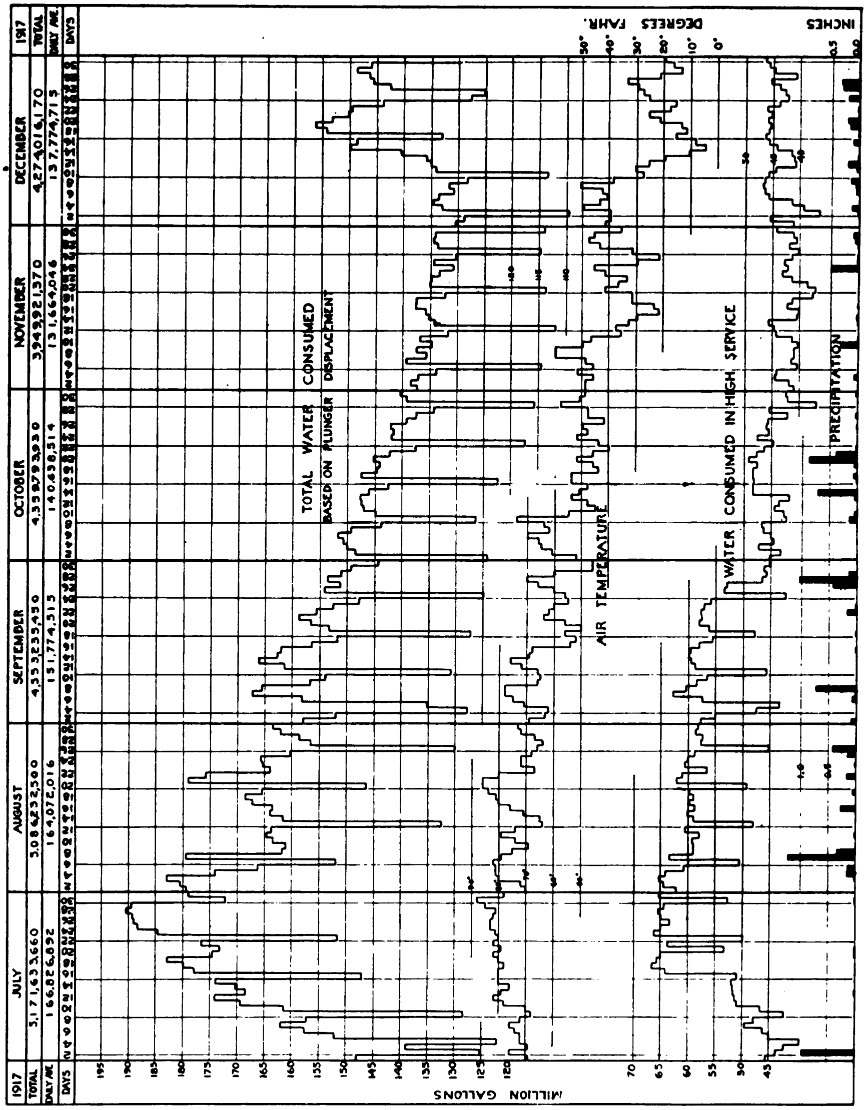
Summary of Monthly Averages—July, 1916-July, 1917

	RAW WATER							TREATED WATER							TAP WATER				
	Agar at 20°	Agar at 37°	Gelatin at 20°	B. Coli 1 c.c.	B. Coli 10 c.c.	B. Coli 100 c.c.	Turbidity	Agar at 20°	Agar at 37°	Gelatin at 20°	B. Coli 1 c.c.	B. Coli 10 c.c.	B. Coli 100 c.c.	Turbidity	Agar at 20°	Agar at 37°	Gelatin at 20°	B. Coli 1 c.c.	B. Coli 10 c.c.
July—1916	83.6	39.2	66.0	3/50	86/850	....	13.6	8.0	4.2	8.6	0/50	0/250	....	12	11.5	6.2	15.7	0/20	0/125
August	187.0	118.4	93.8	21/54	171/270	....	23.5	7.5	7.5	3.8	0/54	1/270	....	22	7.6	4.9	4.5	0/27	0/135
September	59.2	29.4	66.0	9/50	174/250	....	25.4	5.1	9.2	5.2	0/50	0/250	....	24	13.5	5.5	14.6	0/25	0/125
October	105.7	23.0	126.2	13/52	193/260	....	51.0	6.2	6.4	6.8	0/52	1/260	....	52	9.1	5.4	10.6	0/26	1/130
November	74.0	16.0	90.6	8/48	123/240	....	37.5	5.2	5.5	5.0	0/48	0/240	....	38	6.3	4.3	6.5	0/24	0/120
December	53.4	11.1	68.6	5/46	68/230	....	21.7	3.3	3.2	2.8	0/46	0/230	....	20	4.1	3.6	3.5	0/23	0/115
January—1917	12.0	4.3	15.0	1/42	12/210	....	1.3	1.8	1.8	1.9	0/42	0/210	....	1.2	1.9	1.8	1.7	0/21	0/105
February	4.4	2.8	4.5	0/44	0/220	....	0	1.3	1.2	1.4	0/44	0/220	....	0	1.5	1.1	1.8	0/22	0/110
March	22.9	19.2	25.6	0/52	3/260	....	6.7	8.4	14.3	11.0	0/52	0/260	....	4.4	12.2	16.6	13.5	0/26	1/130
April	87.4	38.4	109.0	0/50	4/230	....	26.2	42.0	22.0	47.2	0/50	1/250	....	25	43.8	24.6	47.3	0/25	1/125
May	36.0	20.4	41.3	35/1	14/255	....	34.0	12.7	13.0	13.8	0/51	6/255	....	25	22.6	11.8	22.9	0/26	2/130
June	13.8	9.5	15.4	0/50	17/250	....	15.0	7.8	7.1	8.1	0/50	7/250	....	11	37.0	10.1	39.3	0/26	8/130
Average	61.6	27.6	60.2	....	....	....	21.6	9.2	7.5	9.6	....	....	....	19.5	14.3	8.0	15.2	....	....
Total	....	....	....	63/189	866/2945	....	....	....	....	....	0/589	16/2945	....	....	....	....	....	0/291	13/1480

Table of Pressures.

	LOCATION OF GAUGES	Elevat'n above City Datum	Pressure Corresponding to diff. in Elevat'n between Pump Wells and Engine Gauges	July 1, 1915 to June 30, 1916. Average Daily Consumption 127,565,434 gallons Total Consumption for Year 46,688,949,000 gallons				July 1, 1916 to June 30, 1917 Average Daily Consumption 147,462,090 gallons Total Consumption for Year 53,823,662,830 gallons				Increase or Decrease in Friction During last Year		Maximum Hour observed July 26, 1916, 10,241,050 gals. 7 p. m. to 8 p. m. Daily Rate 245,785,200 gals.		Minimum Hour observed Dec. 4, 1916 3,410,280 gals. 3 a. m. to 4 a. m. Daily Rate 81,846,720 gals.	
				Pressures, Pounds			Fric. Loss Pounds	Pressures, Pounds			Fric. Loss Pounds	Pounds		Average Pressure Pounds	Fric. Loss Pounds	Average Pressure Pounds	Fric. Loss Pounds
		Feet	Pounds	High	Low	Mean		High	Low	Mean		Inc.	Dec.				
Low Service	Pumping Station	92.00	....	71	20	47.5	....	53	26	49.1	....	....	....	45.2	....	45.7	....
	Engine No. 32, Hart and Jefferson	103.42	4.9	47	24	39.9	2.7	44	24	37.6	6.6	3.9	....	....	....	40.5	0.3
	Engine No. 26, Crane and Brinket	125.79	14.6	38	18	33.3	....	39	17	32.8	1.7	1.7	....	30.0	0.6	32.5	....
	Engine No. 7, Concord, near Jefferson	124.77	14.2	37	15	31.5	1.8	35	12	30.8	4.1	2.3	....	27.0	4.0	30.5	1.0
	Engine No. 19, Congress, near Jos. Campau	122.47	13.2	35	15	31.1	3.2	35	24	31.0	4.9	1.7	....	25.0	7.0	31.0	1.5
	Engine No. 2, Hastings, near Congress	120.98	12.6	34	15	29.5	5.4	37	20	28.6	7.9	2.5	....	28.0	4.6	31.0	2.1
	Water Office, Randolph and Jefferson	125.18	14.4	33	10	27.3	5.8	33	20	27.7	7.0	1.2	....	....	....	28.5	2.8
	Engine No. 3, Griswold and Clifford	123.06	13.4	33	15	29.1	5.0	36	15	30.1	5.6	0.6	....	30.0	1.8	31.0	1.3
	Engine No. 8, Sixth and Baker	122.14	13.1	36	14	28.9	5.5	34	22	29.0	7.0	1.5	....	25.5	6.6	31.0	1.6
	Engine No. 4, Eighteenth, near Howard	116.18	10.5	34	15	29.9	7.1	34	22	30.0	8.6	1.5	....	22.0	12.7	31.5	3.7
	Engine No. 10, Sixteenth and Bagg	125.28	14.4	34	12	28.0	5.1	33	17	28.4	6.3	1.2	....	20.0	10.8	....	....
	Engine No. 15, Hubbard near Fort	114.62	9.8	38	17	31.8	5.9	38	24	31.7	7.6	1.7	....	28.5	6.9	34.0	1.9
	Engine No. 29, Solvay and W. Jefferson	115.05	10.0	37	15	30.7	6.8	36	6	30.2	8.9	2.1	....	20.5	14.7	31.0	4.7
	Truck No. 13, Fort and Lewerenz	115.56	10.2	38	16	30.2	7.1	36	18	29.6	9.3	2.2	....	18.5	6.5	31.0	4.5
	Engine No. 27, Junction and Rogers	113.74	9.4	39	17	32.0	6.1	38	20	31.7	8.0	1.9	....	20.5	15.3	34.5	1.8
	Engine No. 14, Scotten near Michigan	121.37	12.7	37	18	33.0	1.8	38	22	32.5	3.9	2.1	....	22.0	10.5	36.5	....
	Engine No. 22, Michigan, near Hammond	119.14	11.8	36	16	28.6	7.1	34	19	28.1	9.2	2.1	....	21.5	11.9	31.0	2.9
	Truck No. 10, Sheridan and Mack	140.25	20.9	30	8	23.4	3.2	27	15	23.1	5.1	1.9	....	15.5	8.8	23.0	1.8
	Engine No. 18, Mt. Elliott near Sylvester	146.23	23.5	26	5	21.4	2.6	27	13	20.9	4.7	2.1	....	13.0	8.7	20.5	1.7
	Engine No. 11, Grandy, near Gratiot	143.21	22.2	29	8	24.1	1.2	27	13	22.5	4.4	3.2	....	....	....	....	....
	Engine No. 6, High, near Hastings	142.63	21.9	25	13	20.1	5.5	29	14	19.9	7.3	1.8	....	16.0	7.3	21.0	2.8
	Storage Yard, Orleans and Erskine	150.64	25.4	22	5	15.9	6.2	20	9	15.6	8.1	1.9	....	9.5	10.3	17.0	3.3
	Truck No. 5, Russell and Erskine	147.74	24.1	22	2	17.8	5.6	29	10	17.0	8.0	2.4	....	10.5	10.6	18.5	3.1
	Engine No. 5, Alexandrine, near Cass	148.48	24.5	23	1	18.6	4.4	24	10	18.1	6.5	2.1	....	16.5	4.2	19.0	2.2
	Engine No. 12, Sixteenth and Grand River	141.55	21.5	27	3	20.1	5.9	25	12	20.4	7.2	1.3	....	12.0	11.7	20.5	3.7
	Engine No. 31, Cobb and W. Grand Blvd.	135.12	18.7	29	7	22.2	6.6	29	10	22.1	8.3	1.7	....	10.0	16.5	....	....
	Engine No. 20, Baldwin and Gratiot	145.37	23.1	30	6	21.8	2.6	26	10	20.1	5.9	3.3	....	12.0	10.1	23.0	....
	Average	....	....	....	12.4	27.7	....	....	16.9	26.5	....	....	....	....	....	....	....
High Service	Pumping Station	92.00	....	104	45	65.7	....	75	56	65.0	....	....	....	68.0	....	60.5	....
	Engine No. 18, Mt. Elliott, near Sylvester	146.23	23.5	49	31	40.3	1.9	45	29	38.2	8.3	1.4	....	32.5	12.0	37.0	....
	Engine No. 23, Moran and Boulevard	154.29	27.0	41	21	32.8	5.9	37	19	30.2	7.8	1.9	....	28.0	13.0	30.5	3.0
	Engine No. 28, Riopelle and Milwaukee	155.56	27.5	37	14	29.8	8.4	35	17	28.2	9.3	0.9	....	19.0	21.5	29.5	3.5
	Engine No. 13, Russell and Ferry	157.30	28.3	36	19	29.8	7.6	34	18	28.0	8.7	1.1	....	19.0	20.7	30.5	1.7
	Engine No. 17, Cass and Amsterdam	152.83	26.3	36	18	28.2	11.2	35	15	28.3	10.4	....	0.8	16.5	25.2	29.5	4.7
	Engine No. 21, Lincoln, near Piquette	154.88	27.2	32	15	26.5	12.0	33	13	26.7	11.1	....	0.9	16.0	24.8	28.5	4.8
	Engine No. 24, Kenilworth, near John R	155.86	27.6	35	20	28.9	9.2	33	14	26.9	10.5	1.3	....	16.5	23.9	28.5	4.4
	Engine No. 12, Sixteenth and Grand River	141.55	21.5	30	14	24.3	19.9	37	12	29.6	13.9		6.0	14.5	32.0	32.5	6.5
	Storage Yard, Orleans and Erskine	150.64	25.4	43	20	30.8	9.5	37	15	28.0	11.6	2.1	....	20.5	22.1	27.0	8.1
	Engine No. 1, Hamtramck	....	....	35	14	25.6	....	31	7	20.3	....	....	....	9.5	....	27.0	....
	Average	....	....	....	21.0	33.7	....	....	20.2	28.4	....	....	....	....	....	....	....


1917
TOTAL
DAILY AVE
DAYS
JANUARY
4,604,605,690
148,536,958
FEBRUARY
4,636,553,000
165,591,250
MARCH
4,496,164,320
145,037,559
APRIL
4,077,090,900
135,903,030
MAY
4,299,531,870
138,694,576
JUNE
4,314,841,970
143,828,066
TOTAL WATER CONSUMED
BASED ON PLUNGER DISPLACEMENT
AIR TEMPERATURE
WATER CONSUMED IN HIGH SERVICE
PRECIPITATION
MILLION GALLONS
195
190
185
180
175
170
165
160
155
150
145
140
135
130
125
120
115
55
50
45
40
DEGREES FAHR.
70°
60°
50°
40°
30°
20°
10°
0°
INCHES
1
0.5
0.0


1917
TOTAL
DAILY AVE.
DAYS
JULY
5,171,633,660
166,826,892
AUGUST
5,086,232,500
164,072,016
SEPTEMBER
4,553,235,450
151,774,515
OCTOBER
4,359,793,930
140,638,514
NOVEMBER
3,949,921,370
131,664,046
DECEMBER
4,274,016,170
137,774,715
MILLION GALLONS
195
190
185
180
175
170
165
160
155
150
145
140
135
130
125
120
70
65
60
55
50
45
DEGREES FAHR.
50°
40°
30°
20°
10°
0°
INCHES
0.5
0.0
TOTAL WATER CONSUMED
BASED ON PLUNGER DISPLACEMENT
AIR TEMPERATURE
WATER CONSUMED IN HIGH SERVICE
PRECIPITATION

PIPE SYSTEM

The work on the construction of new extensions of water mains was materially hampered during the latter half of 1916 by shortage of labor, and throughout the Spring of 1917 by excessive rains. In an effort to overcome the difficulties due to lack of labor, the use of machinery was resorted to as far as possible. Four mechanical trench excavators were purchased, one steam and three gasoline operated, and also four gasoline operated back-fillers, and one portable air-compressor for caulking. The use of these machines throughout the current year resulted in the laying of a larger quantity of pipe with a considerably smaller force than would have been possible by the use of hand labor only, and despite the unfavorable weather conditions which prevailed for the first half of 1917, the total length of water mains laid was the greatest of any year in the history of the Water Board.

The total quantity of pipe actually laid during the year was 369,959 feet or 70.0 miles, of which 9.5 were main feeders, 12 inches in diameter or larger. These figures represent lines actually constructed, and are in excess of those given in the table of "Summary of Amount of Pipe Laid," as the latter shows only those extensions completed as a whole prior to June 30, 1917, and on which all costs had been entered in the records of completed jobs. This table gives the quantity of pipe laid as 271,416 feet or 51.4 miles, and 1.2 miles of small obsolete mains removed and replaced with larger ones, making a net gain of 50.2 miles, resulting in a total of 1055 miles of water mains of all sizes in the entire system.

Of the total mileage given, 153.2 miles is 12 inches in diameter and larger, and the 54.2 miles is 42 inches and 48 inches diameter.

Work has been in progress on the extension of the 36 inch main in Twelfth Street northwardly from Euclid Avenue to Ford Highway and thence westwardly on Ford Highway to Linwood Avenue where it will connect with the 42 inch main running south from the six mile road. Work is underway also on the 42 inch main from Holbrook and Dequindre northwardly on Dequindre to connect with the projected 48 inch main on the Six Mile Road.

The 24 inch main on Clairmount Avenue and Joy Road from Twelfth Street to Grand River Avenue, and the 16 inch main on Dexter Boulevard from Joy Road northwardly, are two of the important feeders to the northwesterly section of the City which are now in process of laying.

The total amount expended in the construction of water mains for the current year was $637,872.63, the unit costs of the several sizes being shown in the table below:

COST PER FOOT OF WATER MAINS

Size	No. of Feet	Material, etc.	Labor	Overhead Expense	Total
4″	379	.95	1.09	.13	2.17
6″	153,296	.71	.46	.05	1.22
8″	72,898	.98	.55	.06	1.59
10″	4,311	1.38	.69	.08	2.15
12″	15,762	1.79	.86	.10	2.75
16″	7,574	2.33	1.20	.14	3.67
24″	2,007	4.68	2.25	.26	7.19
36″	2,077	7.42	3.28	.38	11.08
42″	13,112	10.35	5.67	.65	16.67

The general increase in the unit cost of pipe laid as shown in the table is due to the higher cost of material; to shortage of labor resulting in gangs too small for good economic results; to higher wages paid, and to unfavorable weather conditions, all of these being contributory factors in raising the cost, which was offset in part only during a portion of the year by the utilization of trenching machines, and by the adoption of the method of laying longer extensions, regardless of whether any houses have been built or started on the line of proposed extensions.

The following series of tables give in full detail all information relating to the mains laid on completed jobs during the year, both in Detroit and surrounding territory supplied through the Detroit system, and also a summary of all water mains in the distribution system.

DISTRIBUTION SYSTEM

Total Amount of Pipe Laid and Discontinued in the Districts Named During the Year Ending June 30, 1917

	Detroit		Hamtramck	St. Clair Heights	Grosse Pt. Parks	Oakwood	Ecorse	Grosse Pt.		
	Feet Laid	Feet Disc.	Feet Laid	Feet Laid	Feet Laid	Feet Laid	Feet Laid	Feet Laid	Total Feet Laid	Total Feet Disc.
3"		560								560
4"	379	2,667							379	2,667
6"	114,604	2,167	15,292	8,455	9,910	775	4,260		153,296	2,167
8"	65,655	717		3,135			856	3,252	72,898	717
10"	4,311								4,311	
12"	15,762	303							15,762	303
16"	7,574								7,574	
24"	2,007								2,007	
36"	2,077								2,077	
42"	13,112								13,112	
	225,481	6,414	15,292	11,590	9,910	775	5,116	3,252	271,416	6,414

Amount in Miles	51.40
Discontinued in Miles	1.21
Net Gain	50.19

Total Pipe in System, June 30, 1917

Size	Detroit		Grosse Pointe Parks	St. Clair Heights	Ham-tramck	River Rouge	Ecorse	Oak-wood	Highland Park	Outside City		Entire System	
	Total	%	Total	Total	Total	Total	Total	Total	Total	Total	%	Total	%
2″	4,624	.094	....	....	....	....	....	....	....	....	....	4,624	.08
3″	48,783	.99	....	....	....	....	....	....	....	....	....	48,783	.87
4″	728,067	14.81	....	....	20,748	10,987	1,943	....	....	33,678	5.00	761,745	13.63
6″	2,165,373	44.04	29,173	47,903	168,535	47,374	34,179	18,978	111,376	457,518	67.91	2,622,891	46.92
8″	915,378	18.62	18,648	17,573	45,341	9,426	12,471	4,032	39,101	146,592	21.76	1,061,970	19.00
10″	245,773	5.00	....	49	3,476	....	....	....	4,298	7,823	1.16	253,596	4.54
12″	222,197	4.52	....	5,189	351	402	....	2,180	4,887	13,009	1.93	235,206	4.21
16″	110,168	2.24	....	....	....	4,298	....	220	9,982	14,500	2.15	124,668	2.23
18″	87	.00	....	....	....	....	....	....	....	....	....	87	.00
20″	393	.01	....	....	....	....	....	....	....	....	....	393	.01
24″	117,917	2.40	....	....	....	....	....	626		626	.09	118,543	2.12
30″	54,651	1.11	....	....	....	....	....	....	....	....	....	54,651	.98
36″	17,018	.35	....	....	....	....	....	....	....	....	....	17,018	.30
42″	144,397	2.94	....	....	....	....	....	....	....	....	....	144,397	2.58
45″	103	.00	....	....	....	....	....	....	....	....	....	103	.00
48″	141,884	2.89	....	....	....	....	....	....	....	....	....	141,884	2.54
Feet	4,916,813	....	47,821	70,714	238,451	72,487	48,593	26,036	169,644	673,746	....	5,590,559	....
Miles	931.21	....	9.06	13.39	45.16	13.73	9.20	4.93	32.13	127.60	....	1058.81	....

Summary of Amount of Pipe Laid in Detroit and Outside Villages, Year Ending June 30th, 1917

LOCATION	Feet	Size	Mat., Etc.	Labor	Overhead Expense	Total	Grand Total	Average Mat.	Average Labor	Average Ov'h'd.	Grand Average
City of Detroit	379	4"	$ 359.49	$ 414.75	$ 48.02	$ 822.26	....	$ 0.95	$1.09	$ 0.13	$ 2.17
	114,604	6"	80,719.75	52,891.72	6,123.84	139,735.31	....	.71	.46	.05	1.22
	65,655	8"	64,588.53	36,177.07	4,219.86	104,985.46	....	.98	.55	.06	1.59
	4,311	10"	5,940.21	2,980.58	356.47	9,277.26	....	1.38	.69	.08	2.15
	15,762	12"	28,248.19	13,507.17	1,564.14	43,319.50	....	1.79	.86	.10	2.75
	7,574	16"	17,683.30	9,095.73	1,046.91	27,825.94	....	2.33	1.20	.14	3.67
	2,007	24"	9,395.32	4,521.06	523.54	14,439.92	....	4.68	2.25	.26	7.19
	2,077	36"	15,419.01	6,812.56	788.89	23,020.46	....	7.42	3.28	.38	11.08
	13,112	42"	135,722.78	74,292.84	8,573.12	218,588.74	$582,014.85	10.35	5.67	.65	16.67
Village of Hamtramck	15,292	6"	11,874.10	6,544.34	757.83	19,176.27	19,176.27	.77	.43	.05	1.25
Village of St. Clair Heights	8,455	6"	5,556.43	1,951.21	225.94	7,733.58	....	.65	.23	.03	.91
	3,135	8"	2,820.66	975.36	112.93	3,908.95	11,642.53	.90	.31	.04	1.25
Village of Grosse Pointe Parks	9,910	6"	7,516.06	4,248.72	492.02	12,256.80	12,256.80	.75	.43	.05	1.23
Village of Oakwood	775	6"	691.40	279.72	32.39	1,003.51	1,003.51	.89	.36	.04	1.29
Village of Ecorse	3,540	6"	2,464.38	1,954.45	226.33	4,645.16	....	.70	.55	.06	1.31
	856	8"	540.37	525.83	60.89	1,127.09	5,772 25	.63	.61	.07	1.31
Township of Ecorse	720	6"	991.71	734.16	85.01	1,810.88	1,810.88	1.39	1.01	.12	2.52
Township of Grosse Pointe	3,252	8"	3,167.91	920.99	106.64	4,195.54	4,195.54	.97	.28	.04	1.29
	271,416		$393,699.60	$218,828.26	$25,344.77	$637.872.63	$637,872.63				

Pipe Laid Year Ending June 30, 1917

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Nov. 24	Abrey, E. Mt. Elliott East	248	6″	144.27	146.38	16.95	307.60
Mar. 30	Academy, Crawford East	1,160	8″	1,065.98	933.09	108.06	2,107.13
Oct. 25	Ainsworth, Marcus North	218	6″	194.71	96.16	11.14	302.01
Oct. 2	Albert, E. and W. of Tractor	501	6″	....	....	....	....
	Tractor, Fort to Albert	274	6″	691.40	279.72	32.39	1,003.51*
May 24	Anstell, S. Devine South	430	6″	296.86	141.20	16.34	454.40
Jan. 1	Apple Grove, Jefferson South	462	6″	333.24	172.66	20.00	525.90**
June 21	Ashland, 933′ N. Fox Creek North	120	6″	77.33	42.88	4.97	125.18
Mar. 21	Auburn, Jefferson North	861	6″	564.64	534.05	61.84	1,160.53**
Sept. 28	Auderdon, 305′ N. Waterloo North	343	8″	303.04	175.43	20.32	498.79
July 28	Balmoral, Woodward to Gloucester	532	6″	....	....	....	....
	Devonshire, Balmoral to Wellesley	517	6″	....	....	....	....
	Gloucester, Balmoral to Lincoln	467	6″	....	....	....	....
	Wellesley, Devonshire to Glouster	532	6″	2,994.44	1,988.03	230.22	5,212.69
Sept. 9	Barr, Livernois West	295	6″	237.04	158.46	18.35	413.85
July 18	Beard, 551′ N. Fort North	38	6″	32.60	13.85	1.60	48.05
Oct. 28	Beard, N. Bostwick to Goldsmith	175	6″				
	Goldsmith, Beard East	109	6″	268.64	128.58	14.89	412.11
Oct. 4	Begole, Ironwood to S. Tireman	722	8″	717.12	350.88	40.64	1,108.64
Nov. 25	Belleterre, Grand River to N. Welton	1,317	8″				
	Nardin, Chantler North	795	8″				
	Chantler, Belleterre to Nardin	1,119	6″	2,899.18	1,151.97	133.40	4,184.55
Nov. 3	Beniteau, 562′ N. Canfield North	258	6″	152.76	112.33	13.00	278.09
May 5	Bessemore, Harper to W. of Asher	3,703	8″	2,737.29	1,591.08	184.24	4,512.61
Oct. 5	Bethune, Dunedin East	368	6″	287.34	156.99	18.17	462.50
Sept. 29	Bezner, N. and S. of Kercheval	294	12″	564.38	375.80	43.52	983.70
Oct. 5	Blaine, Quincy East	431	6″	316.43	191.12	22.13	529.68
Feb. 23	Blaine, E. Radford East	330	6″	277.68	193.77	22.44	493.89
Dec. 1	Blaine, E. of 12th East	171	6″	109.91	27.33	3.16	140.40
Jan. 31	Blaine, Schmittdiel West	280	6″	273.37	236.18	27.36	536.91
June 16	Blanche, Grand River to Pleasant	770	6″				
	Pleasant, Blanche East	80	6″	618.46	407.64	47.21	1,073.31

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Oct. 3	Boulevard, Frederick to Kirby	378	6″	282.17	181.76	21.05	484.98
Feb. 8	Boulevard, N. Trombley North	89	6″	64.25	141.03	16.33	221.61
Dec. 15	Boulevard, 12th East	231	6″	189.06	157.24	18.21	364.51
Mar. 2	Budnick, Conant East	523	6″	351.17	494.20	57.23	902.60
Oct. 23	Bulwer, W. Parkinson West	38	6″	30.91	15.47	1.78	48.16
Nov. 14	Burns, 463′ S. Moffatt South	423	8″	388.09	279.18	32.33	699.60
Nov. 14	Burns, crossing Canfield	65	8″	87.93	54.71	6.33	148.97
Apr. 11	Cabot, N. Ferndale North	599	6″	426.00	205.11	23.75	654.86
July 11	Cahalan, W. Central West	253	8″	232.45	107.02	12.39	351.86
Aug. 14	Calvert, crossing LaSalle Blvd.	48	6″	....	....	....	....
	Glynn, crossing LaSalle Blvd.	48	8″	....	....	....	....
	Chicago, crossing LaSalle Blvd. (NS)	48	6″	....	....	....	....
	Chicago, crossing LaSalle Blvd. (SS)	48	8″	....	....	....	....
	Boston, crossing LaSalle Blvd. (NS)	48	6″	....	....	....	....
	Boston, crossing LaSalle Blvd. (SS)	48	8″	....	....	....	....
	Gladstone, crossing 14th	73	8″	....	....	....	....
	Hazelwood, crossing 14th	85	6″	....	....	....	....
	Edison, crossing 14th	48	8″	....	....	....	....
	Boston, crossing 14th (NS)	48	6″	....	....	....	....
	Boston, crossing 14th (SS)	48	8″	....	....	....	....
	Chicago, crossing 14th (NS)	48	6″	....	....	....	....
	Chicago, crossing 14th (SS)	48	8″	515.04	398.18	46.12	959.34
Jan. 19	Calvert, W. Hamilton West	236	6″	158.94	153.36	17.76	330.06
Sept. 13	Caniff, E. Ellery to E. Elmtree	1,123	6″	....	....	....	....
	Elmtree, Caniff to Talbot	1,321	6″	....	....	....	....
	Prescott, Elmtree East	941	6″	....	....	....	....
	Harold, Elmtree East	941	6″	....	....	....	....
	Casemere, Elmtree East	941	6″	....	....	....	....
	Talbot, Elmtree East	856	6″	4,658.03	2,230.52	258.29	7,146.84***
Oct. 13	Canton, 263′ N. Strong North	280	6″	174.90	138.06	15.98	328.94
Sept. 8	Cardoni, N. Westminster North	296	6″	177.83	116.35	13.47	307.65
Oct. 25	Carrie, N. Strong North	400	6″	244.48	191.09	22.12	457.69
Feb. 19	Carson, Dix South	1,280	6″	910.09	1,121.02	129.82	2,160.93
May 9	Carter, E. Quincy East	157	6″	150.54	84.54	9.80	244.88

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Jan. 9	Carter, Quincy East	428	6″	319.49	284.96	33.00	637.45
Mar. 16	Cascade, N. Kay North	2,099	8″	2,089.27	1,568.05	181.59	3,838.91
Oct. 2	Central, McGraw North	73	10″	86.98	45.98	5.33	138.29
May 28	Central, N. McGraw North	171	10″	228.47	122.69	14.21	365.37
July 20	Chalmers, N. and S. of Essex	221	8″	253.91	96.60	11.20	361.71
Dec. 13	Chalmers, N. and S. Waterloo	814	6″	525.72	149.98	17.36	693.06
July 18	Charest, Carpenter South	830	6″	....	....	....	....
	McDougall, Carpenter South	831	6″	....	....	....	....
	Mitchell, Carpenter to Casemere	1,628	6″	2,826.69	1,347.61	156.05	4,330.36***
Dec. 6	Charest, Connor South	353	6″	228.73	93.54	10.83	333.10***
Dec. 12	Charlevoix, Alter East	215	6″	206.56	95.35	11.04	312.95
Mar. 2	Charlotte, N. Jefferson North	362	6″	....	....	....	....
	Alexis, N. Jefferson North	315	6″	457.73	514.83	59.62	1,032.18**
Sept. 2	Chatfield, 120′ W. Beard West	228	6″	136.57	98.51	11.40	246.48
Oct. 12	Chene, Carpenter to Grant	2,437	6″	2,114.89	937.64	108.58	3,161.11
Feb. 2	Cherry Grove, Jefferson South	682	6″	522.97	561.45	65.02	1,149.44**
Jan. 9	Cicotte, Horatio North	212	6″	249.68	230.39	26.68	506.75
Mar. 22	Ciliax, Mt. Elliott West	1,160	6″	812.61	750.91	86.96	1,650.48
Mar. 6	Clarendon, Grand River West	930	6″	664.03	340.33	39.41	1,043.77
Mar. 3	Clarendon, E. Colfax East	880	6″	567.57	369.47	42.76	979.80
Aug. 9	Clairmount, 150′ W. Wilson West	507	6″	310.83	305.50	35.37	651.70
Jan. 31	Clairpointe, S. Freud South	212	8″	186.83	187.61	21.73	396.17
May 25	Clayton, W. Parkinson West	152	10″	204.09	163.35	18.92	386.36
Nov. 3	Commonwealth, crossing R. R	139	10″	(lowered)			
	Commonwealth, crossing R. R	500	10″	895.26	885.25	102.52	1,883.03
Jan. 10	Continental, 85′ S. Freud South	330	8″	299.82	153.43	17.77	471.02
Mar. 23	Continental, N. Essex North	1,112	8″	1,082.73	417.81	48.39	1,548.93
April 3	Concord, Marcus South	416	6″	319.96	397.62	46.04	763.62
Mar. 24	Connors, S. Freud South	820	6″	629.45	336.06	38.92	1,004.43
Sept. 29	Connor, Charlevoix North	134	8″	168.29	64.47	7.46	240.22
June 10	Copeland, Wabash R. R. North	261	8″	314.14	206.08	23.87	544.09
Oct. 6	Coplin, N. Waterloo North	702	6″	460.15	371.18	42.98	874.31
Mar. 22	Crawford, Glenmere North	668	6″	468.88	586.00	67.86	1,122.74
Aug. 31	Daniels, 139′ N. Horatio North	491	6″	285.46	216.34	25.05	526.85

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Sept. 18	Delmar, S. Caniff South	496	8″	484.02	220.63	25.55	730.20
Nov. 14	Devereaux, Livernois West	1,231	6″	855.40	457.39	52.97	1,365.76
July 8	Dexter, Euclid to Philadelphia	245	10″	....	....	....	....
	Dexter, Euclid South	80	10″	....	....	....	....
	Philadelphia, Dexter East	338	6″	....	....	....	....
	Euclid, E. and W. of Dexter	1,424	6″	1,565.09	906.90	105.01	2,577.00
Oct. 17	Dexter, Philadelphia to Pingree	270	10″	....	....	....	....
	Pingree, Dexter West	199	6″	637.25	299.65	34.70	971.60
Jan. 8	Dexter, Pingree to Carter	481	10″	694.88	227.03	26.29	948.20
July 17	Dodge, Mt. Elliott West	1,062	6″	687.35	456.30	52.83	1,196.48
Oct. 12	Domine, Mt. Elliott West	1,279	6″	915.82	416.24	48.20	1,380.26
July 21	Drake, 337′ S. Freud South	60	6″	39.62	26.40	3.06	69.08
Dec. 29	Drexel, City Limits North	2,901	8″	2,776.11	724.94	83.94	3,584.99*
Dec. 29	Drexel, N. Charlevoix to City Limits	340	8″	289.78	85.55	9.90	385.23
Oct. 31	Daniels, 175′ N. Essex South	168	8″	158.21	53.25	6.16	217.62
Mar. 30	Eastlawn, S. Freud, South	123	6″	75.85	50.14	5.80	131.79
June 17	Edmonton, Grand River South	590	6″	438.98	263.05	30.46	732.49
Sept. 28	Elizabeth and John R	22	4″	118.29	66.09	7.65	192.03
Sept. 30	Elmer, Michigan North	475	8″	571.79	244.07	28.27	844.13
Dec. 20	Elmtree, Edwin South	182	6″	136.60	27.16	3.15	166.91***
April 3	Emerson, N. Essex South	638	6″	417.32	222.39	25.76	665.47
Sept. 29	Emerson, 903′ E. Central East	97	6″	64.22	30.96	3.59	98.77
Sept. 27	Epworth, 294′ N. Milford North	305	8″	258.25	139.40	16.14	413.79
Jan. 18	Epworth, N. Milford North	62	8″	56.44	34.26	3.97	94.67
Jan. 31	Erbie, Center Line East	983	6″	636.36	599.41	69.41	1,305.18
Dec. 23	Euclid. E. Dexter East	1,660	6″	1,101.83	432.78	50.11	1,584.72
Dec. 7	Euclid, E. and W. 14th	770	6″	....	....	....	....
	14th, Euclid to Nicolet	363	6″	876.17	349.81	40.51	1,266.49
Jan. 13	Eculid, E. and W. Holmur	301	6″	248.64	258.29	29.91	536.84
Oct. 24	Euclid, E. Radford East	279	6″	173.57	113.12	13.10	299.79
June 6	Euclid, 426′ E. Grand River East	480	6″	340.91	183.63	21.27	545.81
July 17	Euclid, W. Wilson West	122	6″	82.16	68.14	7.89	158.19
Oct. 18	Fairview, N. Mack North	438	6″	235.69	50.26	5.82	291.77***
Oct. 6	Falcon, E. and W. Elsmere	414	8″	410.30	147.31	17.05	574.66

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
April 3	Falcon, Woodmere East	708	8″	665.70	197.82	22.71	886.23
July 31	Farr, Mt. Elliott to Budnick	717	6″	....	....	....	....
	Budnick, N. and S. Farr	268	6″	664.01	464.23	53.76	1,182.00
July 25	Farr, Mt. Elliott to Foster	1,140	6″	759.23	519.84	60.18	1,339.25
Mar. 15	Fernwood, Linsdale North	393	6″	255.83	258.05	29.88	543.76
Oct. 25	Field, Wagner to Roland	292	6″	....	....	....	....
	Roland, Field East	308	6″	501.01	174.80	20.24	696.05
May 15	Florida, N. Kirkwood, North	36	8″	49.74	28.30	3.28	81.32
Feb. 3	Gable, E. Center Line East	508	6″	328.90	186.84	21.64	537.38
Sept. 6	Garland, N. Warren to Shoemaker	1,903	6″	1,283.90	788.35	91.29	2,163.54***
Mar. 20	Gartner, Central, West	360	6″	268.47	145.22	16.82	430.51
Nov. 4	Gartner, E. Central to E. Green	38	8″	....	....	....	....
	Gartner, E. Central to E. Green	770	6″	559.56	198.36	22.98	780.90
July 11	Gartner, E. Evans, East	165	6″	101.07	51.58	5.98	158.63
Sept. 26	Girardin, Miller to N. DeBuel	661	6″	....	....	....	....
	DeBuel, Girardin to Foster	203	6″	....	....	....	....
	Heintz, Girardin to Foster	204	6″	843.13	304.91	35.30	1,183.34
Sept. 29	Girardin, Strong North	940	6″	617.25	282.99	32.78	933.02
April 3	Girardin, Marcus South	517	6″	360.98	330.68	38.29	729.95
July 29	Gladstone, W. Wilson to Schmittdeil	1,332	6″	....	....	....	....
	Schmittdiel, Gladstone South	172	6″	982.36	656.46	76.02	1,714.84
Jan. 31	Gladstone, W. Wilson West	75	6″	44.93	58.51	6.77	110.21
July 13	Gladwin, 702′ N. Mack North	1,598	6″	1,063.96	431.04	49.91	1,544.91***
Nov. 10	Gladwin, S. Charlevoix	22	8″	35.97	10.02	1.16	47.15
Nov. 17	Gladys, 307′ W. Livernois West	450	6″	308.01	138.96	16.08	463.05
Sept. 16	Glenmere, Crawford to E. Fremont	1,001	6″	....	....	....	....
	Danbury, Glenmere to N. Penrose	1,327	6″	....	....	....	....
	Exter, Glenmere to N. Penrose	1,334	6″	....	....	....	....
	Fremont, Glenmere to N. Penrose	1,332	6″	3,168.53	2,308.52	267.33	5,744.38
Jan. 22	Glynn, W. Hamilton West	99	8″	84.24	88.44	10.24	182.92
May 2	Glynn, W. Hamilton West	877	8″	776.78	563.12	65.20	1,405.10
Dec. 11	Grand, 12th West	272	6″	221.45	178.18	20.63	420.26
Oct. 27	Grand Marais, Jefferson South	1,832	6″	1,586.39	614.28	71.14	2,271.81***
June 9	Grand River, Plymouth to City Line	4,621	16″	....	....	....	....

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
	Reaume, Grand River North	1,215	6″	10,664.05	6,595.51	763.76	18,023.32
Sept. 13	Gratiot Ct. Gratiot to Harper	572	6″	472.25	421.36	48.79	942.40
Mar. 3	Gray, N. and S. Waterloo	507	8″	496.26	389.12	45.06	930.44
Nov. 17	Green, Navy South	100	8″	154.25	56.43	6.53	217.21
Nov. 13	Hamilton, Shoemaker North	1,965	8″	1,717.17	440.98	51.06	2,209.21***
July 10	Hamilton, Shoemaker South	1,170	8″	1,103.49	534.38	61.87	1,699.74***
May 16	Hancock, Beaufait to Dennis	472	6″	....	....	....	....
	Dennis, Warren to Hancock	440	6″	....	....	....	....
	Meldrum, Hancock South	168	6″	792.41	536.72	62.15	1,391.28
Aug. 14	Hanson, Livernois West	1,217	6″	800.67	467.00	54.08	1,321.75
Nov. 8	Harbor, 223′ W. Ashland West	834	6″	507.71	231.43	26.79	765.93
Apr. 7	Harvard, N. Jefferson North	2,832	6″	2,580.17	1,561.99	180.88	4,323.04**
Dec. 9	Hazelwood, W. Wilson West	122	6″	73.27	60.16	6.97	140.40
July 31	Heidelberg, McDougall to Elmwood	739	6″	584.84	631.43	73.11	1,289.38
Apr. 3	Helen, Marcus South	599	6″	418.62	344.00	39.83	802.45
Oct. 31	Highland, Russell East	235	6″	222.55	106.49	12.34	341.38
May 19	Hillsboro, Grand River West	775	6″	553.35	322.77	37.38	913.50
Jan. 27	Hill, Warren to Livernois	831	6″	....	....	....	....
	Livernois, Hill North	100	10″	845.23	589.65	68.28	1,503.16
Sept. 23	Hindle, Caniff South	182	6″	203.92	136.11	15.76	355.79
Jan. 25	Holdin, crossing R. R.	631	8″	917.17	395.68	45.81	1,358.66
May 12	Holden, W. Greenwood to E. Brooklyn	631	8″	....	....	....	....
	12th, Blvd. to N. Euclid	2,077	36″	....	....	....	....
	Holdin, Blvd. to 3rd	4,206	42″	....	....	....	....
	3rd Antoinette to Palmer	784	42″	....	....	....	....
	Palmer, 3rd to W. of 2nd	552	42″	73,419.01	36,355.29	4,209.95	113,984.25
Sept. 4	Homer, 393′ W. Elsmere West	16	6″	28.37	9.91	1.15	39.43
Aug. 16	Hudson, Grand River West	52	6″	95.55	136.17	15.78	247.50
Sept. 15	Hurlbut, Harper North	300	6″	255.71	202.17	23.41	481.29
May 18	Indiandale, E. and W. Ellen	347	6″	234.91	168.28	19.49	422.68
Feb. 19	Inglis, N. Ferndale North	27	6″	15.19	41.86	4.84	61.89
Jan. 6	Iosco, Grand River North	244	6″	160.18	154.11	17.84	332.13
Mar. 16	Iosco, N. Grand River North	158	6″	109.03	74.07	8.58	191.68
Jan. 5	Iosco, S. Mackinaw South	63	6″	46.72	47.67	5.52	99.91

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Mar. 16	Iosco, W. Mackinaw West	195	6″	118.60	90.18	10.44	219.22
Oct. 5	Irene, Grand River to Yosemite	994	6″	....	....	....	....
	Albert, Grand River to Yosmite	774	6″	....	....	....	....
	Yosemite, Albert to N. Kay	2,989	6″	3,281.93	1,764.38	204.32	5,250.63
Sept. 20	Ironwood, 289′ N. Milford North	212	8″	197.19	109.70	12.92	319.81
Sept. 20	Ironwood, 159′ N. Milford North	130	8″	118.08	127.27	14.74	260.09
July 7	Iroquois, Goethe South	518	8″	487.26	174.95	20.26	682.47
June 5	Iroquois, Mack South	328	8″	355.07	161.74	18.73	535.54
Nov. 20	James Ct., Holcomb East	228	6″	191.15	162.98	18.88	373.01
Nov. 24	Jameson, Pennsylvania West	138	6″	109.76	122.61	14.20	246.57
May 22	Jefferson, McClellan to Belvidere	277	6″	255.23	289.98	33.58	578.79
Aug. 28	Joy, Vinewood West	682	24″	....	....	....	....
	Petoskey, crossing Joy	45	8″	....	....	....	....
	Lovette, Joy North	2,584	8″	....	....	....	....
	Scotten, Joy North	2,604	8″	....	....	....	....
	Vinewood, Joy North	2,660	6″	9,056.01	4,955.32	573.83	14,585.16
Oct. 7	Kercheval, Drexel to W. Rusch	760	16″	....	....	....	....
	Kercheval, Rusch to W. Oneida	425	16″	....	....	....	....
	Kercheval, Oneida to Alter	1,768	16″	7,783.30	2,995.73	346.91	11,125.94
Nov. 24	Kerwin, Harper South	59	6″	....	....	....	....
	Harper, Kerwin West	64	8″	149.78	94.16	10.90	254.84
Nov. 24	Kerwin, S. Harper South	174	6″	112.75	47.12	5.45	165.32***
Feb. 26	Klein, Conant East	270	6″	271.96	312.02	36.14	620.12
Nov. 18	Kosciuzsko, E. Mt. Elliott East	61	6″	35.30	27.58	3.18	66.06
July 2	Ladue, Baldwin East	289	6″	226.33	127.72	14.79	368.84
July 21	Lakewood, 60′ S. Essex South	100	8″	100.12	33.86	3.92	137.90
Feb. 15	Lakewood, S. Essex South	1,802	8″	1,767.96	1,129.60	130.81	3,028.37
Oct. 10	Lakewood, Kercheval North	469	6″	290.83	165.49	19.16	475.48
Mar. 13	Lakeview, S. Waterloo North	938	8″	905.31	865.48	100.22	1,871.01
June 19	Lane, 363′ W. Lawndale West	91	8″	89.41	44.34	5.14	138.89
Sept. 5	Lane, 472′ W. Lawndale West	99	8″	80.47	38.00	4.40	122.87
Oct. 28	Lane, 374′ E. Central East	64	6″	45.42	25.01	2.90	73.33
Nov. 17	Lane, E. Central East	60	6″	74.14	34.28	3.97	112.39
Mar. 17	Lane, Central West	420	6″	313.23	172.53	19.98	505.74

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
July 25	LaSalle, Gardens North, 750′ E. of 14th East	72	6″	44.00	30.58	3.54	78.12
July 31	LaSalle Gardens, S., Dunedin West	195	8″	175.97	93.16	10.79	279.92
Sept. 6	Laurain, Ferndale North	611	6″	465.51	179.67	20.80	665.98
Nov. 18	Lawrence, 709′ W., Hamilton West	284	8″	213.51	120.03	13.89	347.43
Sept. 23	Lee, 12th East	201	6″	....	....	....	....
	12th, Lee to Camden	218	8″	....	....	....	....
	Camden, 12th East	571	6″	747.36	498.24	57.70	1,303.30
Dec. 21	Lehman, Conant West	1,177	6″	837.97	502.61	58.20	1,398.68 ***
July 5	Leigh, Dearborn to Peterson	192	6″	....	....	....	....
		2,321	12″	4,552.18	1,741.86	201.70	6,495.74
Feb. 26	Lenox, Kercheval South	730	8″	695.25	422.48	48.92	1,166.65
Feb. 26	Lenox, N., Jefferson North	175	8″	184.99	143.64	16.64	345.27
Oct. 30	Lenox, N., Jefferson North	121	8″	115.86	70.75	8.25	194.86
Oct. 18	Lemay, Shoemaker South	2,183	6″	1,463.90	146.54	16.97	1,627.41***
May 27	Lincoln, crossing R. R	602	8″	835.09	1,865.08	215.98	2,916.15
Dec. 4	Linslade, W. Ironwood West	768	6″	479.63	365.74	42.35	887.72
June 24	Linslade, W. Grand River West	1,200	6″	768.69	494.76	57.29	1,320.74
Nov. 22	Linslade, Colfax, East	317	6″	229.41	138.68	16.06	384.15
Sept. 2	Lipton, Reaume, East	297	6″	244.17	113.84	13.18	371.19
July 19	Linwood, crossing Montgomery	62	8″	115.22	44.23	5.12	164.57
Aug. 9	Linwood, crossing Vicksburg	62	8″	81.77	56.30	6.58	145.15
Nov. 13	Linwood, Montgomery to Vicksburg	229	8″	252.49	144.23	16.70	413.42
July 18	Lodge, S. of Jefferson, South	133	8″	121.91	75.92	8.79	206.62
Nov. 8	Longworth, Elsmere West	209	8″	173.63	78.71	9.11	261.45
April 3	Longworth, Woodmere East	732	8″	696.40	383.34	44.39	1,124.13
June 20	Lycaste, 870′ S. Mack South	552	6″	336.50	246.31	28.52	611.33
June 20	Lycaste, N. and S. Goethe	162	6″	137.65	107.53	12.45	257.63
Dec. 9	McDougall, Caniff North	786	6″	626.80	176.77	20.46	824.03
Oct. 17	Mackie, 282′ W., Yale West	317	6″	209.26	122.00	14.13	345.39
Aug. 14	Mackinaw, 55′ N., Cottrell North	149	6″	99.06	59.28	6.86	165.20
June 19	Manistique, N., Essex South	12	8″	25.03	11.65	1.35	38.03
Nov. 2	Manistique, 308″ N., Essex South	277	8″	250.13	79.64	9.22	338.99
Sept. 2	Manistique, N. and S. Kercheval	2,106	8″	2,098.37	653.37	75.66	2,827.40

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Mar. 15	Manistique, N. and S. Essex	947	8″	895.27	311.33	36.06	1,242.66
July 21	Maplewood, W. Ironwood	391	6″	....	....	....	....
	Colfax, Maplewood to Clarendon	575	8″	....	....	....	....
	Clarendon, Colfax East	158	6″	957.16	549.14	63.60	1,569.90
Oct. 19	Marcus, Center Line East	966	8″	932.84	240.48	27.84	1,201.16
Aug. 23	Martin, 25′ N., Horatio North	564	10″	676.43	270.05	31.27	977.75
Oct. 30	Martin, Burwell to Wagner	1,606	10″	....	....	....	....
	Burwell, Martin to Braden	379	6″	....	....	....	....
	Braden, Burwell South	230	6″	2,497.72	964.41	111.68	3,573.81
Aug. 14	Martindale, N., Grand River North	30	6″	21.91	11.83	1.38	35.12
Feb. 3	Martindale, N., Joy North	297	8″	259.75	507.34	58.75	825.84
Nov. 8	Martindale, N., Grand River North	450	6″	....	....	....	....
	Alviston, Joy North	464	8″	736.53	324.54	37.58	1,098.65
Feb. 15	Marlborough, S., Essex South	37	8″	30.96	32.75	3.79	67.50
Aug. 31	Marlborough, N. and S., Kercheval	259	6″	238.50	186.57	21.60	446.67
Dec. 7	Marlborough, N., Kercheval North	2,019	6″	1,321.18	529.56	61.32	1,912.06
Nov. 24	Marietta, Pennsylvania West	133	4″	89.97	104.42	12.09	206.48
Nov. 27	Maxwell, Norvell to Canfield	203	6″	152.20	82.67	9.57	244.44
July 16	Mathews, Helen West	162	4″	106.01	116.76	13.52	236.29
Feb. 19	Maxwell, Harper North	538	6″	395.49	595.67	68.97	1,060.13
July 26	Meldrum, Mack to Charlevoix	1,702	12″	3,111.14	1,557.41	180.35	4,848.90
Oct. 23	Mercier, Martin East	282	6″	231.34	154.30	17.87	403.51
July 13	Michigan Stamping Co., N. Mack	351	8″	391.80	196.05	22.70	610.55*
Mar. 16	Milford, W., Epworth West	79	6″	44.75	126.08	14.60	185.43
Aug. 24	Milwaukee, Oakland to Beaubien	809	12″	1,510.06	1,357.48	157.20	3,024.74
Sept. 20	Monica, Grand River North	744	8″	730.95	464.39	53.78	1,249.12
Feb. 1	Monica, N., Grand River North	121	8″	113.77	130.12	15.07	258.96
Oct. 13	Moran, Carpenter North	1,071	6″	1,177.09	360.40	41.74	1,579.23
Mar. 30	Mill, Webster West	720	6″	991.71	734.16	85.01	1,810.88**
Aug. 10	Nagle, W., Center Line West	605	6″	399.61	285.70	33.08	718.39
Nov. 19	Nardin, N., Grand River to Thomas	422	8″	....	....	....	....
	Thomas, Nardin West	346	6″	671.13	273.02	31.61	975.76
June 10	Navahoe, 767′ S., Jefferson South	146	8″	130.80	87.20	10.10	228.10
Feb. 22	Navahoe, S., Jefferson South	517	8″	485.95	411.23	47.62	944.80

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Mar. 20	Navy, E., Green East	123	8″	97.38	82.20	9.52	189.10
Jan. 2	Oakdale, Mandale North	583	6″	409.68	281.39	32.58	723.65
Mar. 9	Oakdale, N., Ferndale North	882	6″	....	....	....	....
	Woodbine, Oakdale to Augustine	270	6″	....	....	....	....
	Augustine, Woodbine North	610	6″	1,294.84	956.23	110.73	2,361.80
Sept. 9	Orchard Park, Grand River North	680	6″	492.69	414.50	48.00	955.19
Dec. 28	Oregon, E. and W., Thornton	645	8″	625.89	344.95	39.95	1,010.79
July 24	Oregon, W., Ironwood West	312	8″	277.34	191.53	22.18	491.05
July 24	Pacific, E. and W., Ironwood	584	8″	579.72	332.47	38.50	950.69
Jan. 4	Pacific, W., Thornton West	146	8″	131.40	148.56	17.20	297.16
June 22	Palmer, W., Brush to Woodward	1,125	8″	....	....	....	....
	Canfield, Antoine East	203	42″	....	....	....	....
	Antoine, Canfield to Palmer	4,167	42″	....	....	....	....
	Palmer, Antoine to W. of Second	3,200	42″	78,852.78	45,515.11	5,240.65	129,608.54
Oct. 13	Parkview, Jefferson South	605	6″	392.54	362.91	42.02	797.47
Dec. 9	Pasadena, 12th West	28	8″	....	....	....	....
Dec. 9	Pasadena, 12th West	272	6″	263.84	187.75	21.74	473.33
Mar. 6	Peter Smith, Mt. Elliott West	1,330	6″	899.85	587.91	68.08	1,555.84
June 14	Philadelphia, Quincy East	965	6″	683.95	448.36	51.92	1,184.23
June 27	Philadelphia, Schmittdiel East	502	6″	365.94	452.27	52.37	870.58
Sept. 22	Philadelphia, 397′ W., Wilson West	122	6″	74.68	54.48	6.31	135.47
Mar. 13	Philadelphia, E., Radford East	531	6″	372.25	596.42	69.07	1,037.74
Oct. 12	Philadelphia, Dexter West	620	6″	418.91	265.53	30.74	715.18
Oct. 17	Philadelphia, 310′ E., Dexter East	134	6″	141.29	66.81	7.73	215.83
Dec. 5	Philadelphia W., Wilson West	62	6″	38.23	29.34	3.40	70.97
June 20	Philip, N. and S., Essex	1,889	6″	1,767.33	518.40	60.03	2,345.76
Sept. 19	Pingree, E. and W., 12th	439	6″	....	....	....	....
	12th and Pingree	284	8″	977.08	546.42	97.69	1,621.19
Oct. 24	Pingree, Quincy to Radford	355	6″	211.07	215.73	24.99	451.79
Dec. 28	Pingree, E. and W., Holmur	753	6″	431.87	354.45	41.05	827.37
Nov. 25	Pingree, Dexter East	415	6″	328.82	145.25	16.82	490.89
Mar. 30	Piper, N. and S., Essex	840	8″	802.76	458.70	53.11	1,314.57
April 3	Plymouth, Monica to Prospect	1,432	12″	....	....	....	....
	Prospect, Plymouth South	177	8″	....	....	....	....

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
	Semmes, Plymouth South	548	8″	....	....	....	....
	Bryden, Plymouth to S. Thornton	1,076	6″	....	....	....	....
	Shipman, Plymouth to S. Thornton	1,550	8″	5,592.09	2,446.05	283.26	8,321.40
Oct. 12	Post, South St. North	441	6″	340.69	146.87	17.01	504.57
May 18	Proctor, N., Michigan North	741	8″	681.67	367.44	42.55	1,091.66
Aug. 21	Pulling, Joy North	1,299	8″	1,286.82	754.71	87.39	2,128.92
Oct. 23	Quincy, S., Carter to Hazelwood	686	8″	....	....	....	....
	Hazelwood, Quincy East	330	6″	970.56	424.30	49.14	1,444.00
June 20	Rademacher, Army North	92	8″	121.42	65.77	7.62	194.81
Sept. 21	Rathbone, Woodmere to Elsmere	942	6″	658.57	254.60	29.48	942.65
Sept. 19	Reddig, 666′ S., Freud South	726	6″	494.41	213.81	24.76	732.98
Nov. 14	Regular, Artillery East	216	6″	180.59	132.53	15.35	328.47
Sept. 30	Richardson, Mt. Elliott East	382	6″	302.09	137.75	15.96	455.80
Mar. 19	Rockwood, Jefferson North	856	8″	540.37	525.83	60.89	1,127.09††
Oct. 6	Rolfs Pl., 771′ N., Mack North	177	6″	130.17	71.95	8.33	210.45
Mar. 15	Seebaldt, W., Ironwood West	144	8″	129.98	133.55	15.47	279.00
Dec. 2	Seminole, Charlevoix North	511	8″	455.48	228.30	26.44	710.22
Aug. 28	Seneca, N. and S. Canfield	99	8″	100.62	54.76	6.34	161.72
Feb. 10	Seminole, N., Harper North	62	6″	38.34	62.61	7.25	108.20
Dec. 5	Seward, E., 14th East	145	8″	141.40	51.09	5.91	198.40
Feb. 13	Seward, W., Wilson West	52	6″	29.99	63.09	7.30	100.38
July 24	Seward, 440′ E. of 14th East	266	8″	244.92	124.45	14.41	383.78
Dec. 8	Seward, Wilson West	100	6″	65.16	59.91	7.01	132.08
Sept. 22	Sheridan, Harper to N. Duncan	367	24″	....	....	....	....
	Harper, Sheridan to Baldwin	632	24″	....	....	....	....
	Baldwin, crossing Harper	56	24″	5,775.13	3,058.96	354.23	9,188.32
Dec. 30	Sherwood, Huber to Marcus	1,264	6″	....	....	....	....
	Huber, W., Sherwood to E. Winfield	1,260	8″	2,042.48	636.10	73.66	2,752.24
Feb. 15	Springwells, N., Michigan North	243	8″	230.88	308.45	35.71	575.04
Feb. 16	Sherwood, Huber to City Line	170	6″	138.63	76.84	8.90	224.37
Feb. 16	Sherwood, City Line to Greenwood	1,022	6″	....	....	....	....
	Greenwood, Sherwood to A. W. VanDyke	2,360	6″	2,559.38	2,166.13	250.84	4,976.35†††
Nov. 16	Sheridan, Chene to Dubois	305	6″	228.85	66.33	7.69	302.87
Nov. 3	Sloman, Russell East	174	6″	169.59	77.08	8.93	255.60

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Oct. 28	Spokane, E. and W., Thornton	735	8″	719.25	304.30	35.25	1,058.80
Feb. 16	Springwells, S., Malta South	111	8″	110.95	93.82	10.87	215.64
Nov. 4	St. Clair, 278′ N., Warren North	1,901	6″	1,243.47	375.57	43.50	1,662.54***
Dec. 15	Starr, Dix South	425	8″	384.93	135.85	15.73	536.51
Sept. 13	Sterritt, 691′ E., Gratiot East	158	8″	160.85	41.08	4.76	206.69
Feb. 20	Stoepel, Grand River North	593	6″	511.80	650.21	75.29	1,237.30
Nov. 10	Sturtevant, 12th West	44	8″	....	....	....	....
		202	6″	178.92	94.23	10.91	284.06
May 7	Tarnow, N. and S. Wagner	240	8″	271.64	153.43	17.77	442.84
Mar. 23	Tennessee, S., Freud South	61	8″	55.07	26.63	3.08	84.78
June 3	Tennyson, 990′ S., Freud South	739	8″	676.55	290.22	33.61	1,000.38
July 11	Thornton, Tireman South	361	6″	243.47	185.83	21.52	450.82
June 2	Thornton Pl., 80′ E., Ironwood West	773	8″	701.87	350.07	40.54	1,092.48
July 13	Thornton, 192′ N., Milford North	157	6″	97.46	75.55	8.75	181.76
Sept. 26	Thornton, 366′ S., Tireman South	405	6″	279.70	144.00	16.67	440.37
Aug. 7	Theodore, W., St. Aubin West	62	4″	45.22	127.48	14.76	187.46
Oct. 18	Traverse, Van Dyke East	438	8″	....	....	....	....
	Holcomb, Woodlawn North	578	8″	....	....	....	....
	Van Dyke, Woodlawn to Traverse	270	24″	....	....	....	....
	Woodlawn, Gratiot to Van Dyke	5,931	12″	11,829.70	4,329.36	501.35	16,660.41
Mar. 14	Traverse, E., Van Dyke East	997	8″	926.46	692.73	80.21	1,699.40
May 27	Trumbull, crossing R. R.	1,008	12″	1,742.56	1,703.79	197.30	3,643.65
Feb. 21	Turner, Lawn to Woolworth	28	6″	....	....	....	....
		257	12″	574.65	1,025.77	118.78	1,719.20
Nov. 2	Tuxedo, 12th West	258	6″	211.25	100.53	11.64	323.42
June 29	Van Court, Tireman South	278	8″	311.15	179.44	20.78	511.37
Dec. 19	Vancouver, E. and W. Thornton	243	8″	304.83	132.89	15.38	453.10
Feb. 8	Van Dyke, N., Hardyke North	183	6″	120.13	227.08	26.30	373.51
Nov. 15	Vernor, 136′ W., Gilbert West	63	6″	37.96	30.11	3.49	71.56
July 7	Virginia, 257′ W. of 12th St. West	180	6″	114.82	96.58	11.17	222.57
Feb. 23	Virginia, 14th East	581	6″	423.16	646.95	74.92	1,145.03
Mar. 23	Wagner, Mt. Elliott West	1,304	8″	1,449.74	1,087.07	125.88	2,662.69
Nov. 18	Walnut, Plymouth South	1,871	6″	1,292.52	738.08	85.46	2,116.06
Jan. 25	Walton, Warren East	1,181	6″	769.67	682.94	79.08	1,531.69

1916-17 Date	Location	Feet	Size	Material	Labor	Overhead Expense	Total Cost
Nov. 20	Warner, Grand River to Green	1,909	8″	....	....	....	....
	Lawn, E. and W. Warner	918	6″	....	....	....	....
	Woolworth, E., Warner to E. Bryden	637	6″	....	....	....	....
	Woodbine, Shipman to Turner	563	6″	3,618.04	1,578.69	182.81	5,379.54
Sept. 28	Warren, W. of P. M. R. R. West	69	10″	....	....	....	....
		2,008	12″	3,895.68	1,088.78	126.08	5.110.54
Sept. 2	Welton, Reaume East	242	6″	213.62	121.15	14.03	348.80
Dec. 8	Westfield, Jefferson North	858	6″	585.80	171.46	19.85	777.11††
Nov. 9	Whittaker, 366′ E., Green East	64	8″	55.26	34.44	3.99	93.69
Mar. 15	Whittaker, E., Central East	228	8″	213.44	106.31	12.31	332.06
July 11	Whittaker, Green East	382	8″	382.39	115.92	13.42	511.73
June 5	Whitman, 303′ S., Freud South	156	6″	96.58	58.14	6.74	161.46
Aug. 25	Whitewood, N., Cobb to N. Milford	365	6″	272.20	151.71	17.56	441.47
Mar. 15	Whitewood, N., Milford North	353	6″	251.24	275.16	31.86	558.26
Aug. 21	Whitewood, S., Tireman South	275	6″	195.23	92.60	10.72	298.55
Dec. 2	Whitewood, N., Milford North	62	6″	38.15	11.66	1.35	51.16
Sept. 6	Willette, Livernois West	544	8″	554.70	196.88	22.80	774.38
Dec. 21	Willette, W., Livernois West	.....	.....	186.68	....	....	186.68
Feb. 9	Willette, W., Livernois West	122	8″	118.57	116.72	13.51	248.80
Dec. 4	Winkelman, Conant East	394	6″	....	....	....	....
	Conant, crossing Winkelman	60	8″	353.99	299.71	34.71	688.41
April 12	Woodmere, Oakdale to Cabot	303	6″	280.04	73.00	8.45	361.49
Feb. 20	Woolworth, Blanche West	129	6″	165.08	144.01	16.67	325.76
Nov. 15	Wyoming, Mt. Elliott to Foster	1,411	6″	1,026.00	465.97	53.96	1,545.93
Oct. 10	Yellowstone, Joy North	2,790	8″	2,544.19	1,004.40	116.31	3,664.90
May 20	Yorkshire, Jefferson to Mack	5,246	6″	3,349.50	2,072.45	240.00	5,661.95**
Feb. 27	Yosemite, Joy to Albert	453	6″	318.80	692.25	80.17	1,091.22

†Village of Oakwood.
††Village of Ecorse.
†††Village of Hamtramck.
*Township of Grosse Pointe.
**Village of Grosse Pointe Parks.
***Village of St. Clair Heights.

STORAGE YARD

The work done at the Storage Yard, which includes all repairs to water mains, tapping of mains for service connections, testing, repairing and setting of meters, and the handling of all material, supplies and equipment, is set forth in detail in the accompanying tables.

Division of Storage Yard Labor Year Ending June 30th, 1917

Loading, unloading, storing and checking materials	$15,100.15
Cleaning, triming and plugging salvaged pipe and special castings	31.26
Watching and care of yards, buildings and equipment	6,720.08
Caring for stables, wagons and harness	3,221.55
Night, Sunday and holiday emergency crews	10,551.40
Repairing and maintaining motor vehicles and other gasoline driven equipment	3,781.19
Repairing wagons and harness	79.75
Horseshoeing	307.08
Repairing and maintaining tools and equipment	10,830.80
Superintendence and clerical work	15,879.89
Special jobs	344.52
Total	$66,847.67

General Work, Year Ending June 30th, 1917

	Material	Labor	Total
Tapping mains and making 6,732 ⅝", 2,757 ¾", 1,964 1", 117 1½", 141 2", 87 3", 38 4", 24 6", 2 8" and 1 10" service connections and discontinuing 141 ⅝", 9 ¾" and 30 1"	$16,976.93	$ 8,582.06	$25,558.99
Public drinking fountains set (4)	157.30	101.01	258.31
Examining, repairing and maintaining gates and wells	2,489.62	2,864.27	5,353.89
Repairing leaks and breaks in mains (198)	1,590.73	4,048.70	5,639.43
Attending to leaks on service connections (832)	844.54	3,136.67	3,981.21
Responding to false reports of leaks (128)	144.94	278.47	423.41
Opening blow-off to flush dead ends	250.84	2,172.27	2,423.11
Shutting service connections on account of leaks and non-payment and letting on same	120.84	298.12	418.96
Examining fire plants, air chambers, hydraulic elevators, river connections, setting pressure gauges and reading pressures	243.84	798.76	1,042.60
Curing no water and short supply complaints	224.81	989.66	1,214.47
Repairing sunken trenches and damaged walks and lawns	78.00	353.46	431.46
Caring for drinking fountains	186.85	1,074.06	1,260.91
Setting hydrants—Billed Village of Ecorse	204.37	45.17	249.54
Laying 4" and 6" pipe in Riverside Park—Billed Recreation Commission	528.76	44.51	573.27
Martin S. of Pittsburgh. Moving 2 blow-offs	52.05	38.94	90.99
Setting hydrant—Billed Township of Greenfield	123.57	44.03	167.60
Setting 6" meter—Billed Village of Hamtramck	357.06	37.24	394.30
Maintenance of Main Office building and equipment	65.22	385.12	450.34
Maintenance of buildings, fences and equipment	99.51	....	99.51
Operation and maintenance of yards and buildings	22.59	....	22.59
Yard cartage and expressing to stores	1,337.00	2,040.31	3,377.31
Yard supplies and expense	21.73	....	21.73
Repair and maintain tools and equipment	195.95	....	195.95
	$26,317.05	$27,332.83	$53,649.88

SERVICES AND METERS

During the year 11863 new services were installed, and 180 old services were removed, making a net gain of 11,683, which makes a total of 143,713 service connections of all sizes in the system.

Size		Installed	Removed	Net Increase	Total in System
⅝″	Service Cocks	6732	141	6591	98652
¾″	Service Cocks	2757	9	2748	4825
1″	Service Cocks	1964	30	1934	37016
1½″	Service Cocks	117		117	130
2″	Service Cocks	31		31	44
2″	Sleeve and Valve	110		110	1475
3″	Sleeve and Valve	87		87	852
4″	Sleeve and Valve	38		38	468
6″	Sleeve and Valve	24		24	227
8″	Sleeve and Valve	2		2	20
10″	Sleeve and Valve	1		1	3
12″	Sleeve and Valve				1
	Totals	11,863	180	11,683	143,713

All new services were metered and 6868 old services were equipped with meters, the total net gain in metered services being 18551, making a total of 65542 meters in services at the end of the fiscal year.

The following tables give the number of meters set, the cost of installing, cost of testing and the types and sizes of meters in service.

Number of Meters Set, Year Ending June 30, 1917

	⅝″	¾″	1″	1½″	2″	3″	4″	6″	8″	10″	16″	Ind.	Total
In Service July 1 1916	28230	13012	3566	796	752	292	208	100	5	1	1	28	46991
Set during year ending June 30, 1917	16316	5589	1360	114	103	49	29	10	2	..	..	..	23572
Total	44546	18601	4926	910	855	341	237	110	7	1	1	28	70563
Removed during year ending June 30, 1917	2999	1446	534	15	19	3	1	2	..	..	..	2	5021
Net Gain	13317	4143	826	99	84	46	28	8	2	..	..	2	18551
Total in service July 1, 1917	41547	17155	4392	895	836	338	236	108	7	1	1	26	65542

Cost of Installing Meters, Year Ending June 30th, 1917

Size	Number	Labor and Cartage	Material	Total	Ave. Labor and Cartage	Ave. Material	Average Cost.
⅝″	13,317	$4,660.95	$55,931.40	$60,592.35	$0.35	$4.20	$4.55
¾″	4,143	1,450.05	26,929.50	28,379.55	0.35	6.50	6.85
1″	826	289.10	7,533.16	7,822.26	0.35	9.12	9.47
1½″	99	105.93	2,196.40	2,302.33	1.07	22.18	23.25
2″	84	89.88	2,730.00	2,819.88	1.07	32.50	33.57
*3″	46						
*4″	28						
*6″	8						
**8″	2						
		$6,595.91	$95,320.46	$101,916.37			

*Set by consumer.
**Set and supplied by consumer.

Cost of Meter Testing, Year Ending June 30th, 1917

Sizes	Number	Flows	Cost	Average
⅝"	13,172	Full to 1/16"	$1,251.37	.09½
¾"	4,143	Full to 1/16"	393.61	.09½
1"	882	Full to ⅛"	83.78	.09½
1½"	83	Full to ⅛"	65.59	.79
2"	75	Full to ⅛"	59.28	.79
3"	46	Full to ⅛"	145.38	3.16
4"	28	Full to ⅛"	88.50	3.16
6"	8	Full to ⅛"	25.31	3.16
8"	2	Full to ⅛"	6.32	3.16
	18,439		$2,119.14	

Kind of Meters in Service, Year Ending June 30th, 1917

	⅝"	¾"	1"	1½"	2"	3"	4"	6"	8"	10"	16"	Ind.	Total
Buffalo American	33	10	7	6	2								58
Desper Indicator												26	26
Gamon Watch Dog *	1,895	206	83	109	157								2,450
Gamon Watch Dog **	20,612	5,867											26,479
Gamon Watch Dog Current								2					2
Hersey D	10	3		12	14	5	7	1					52
Hersey Detector						1	8	19	6	1			35
Hersey F	11	5	1										17
Hersey Rotary			5	2	1								8
Hersey Torrent						5	3	3					11
National Crown			3										3
National Nash	8,359	6,232	965	141	67	27	14						15,805
Neptune			1										1
Neptune Crest Trident											1		1
Neptune Empire Compound							1						1
Pittsburg Eureka							1	1					2
Pittsburg Keystone	28	8	5	3	2		2						48
Thomson	4,460	1,563	2,303	492	458	221	125	41					9,663
Union King	29	9	2	2	3								45
Union Nilo					1		1						2
Worthington	6,110	3,252	1,017	128	130	78	74	41					10,830
Worthington Piston					1	1							2
Worthington Turbine									1				1
	41,547	17,155	4,392	895	836	338	236	108	7	1	1	26	65,542

*235 Revolutions.
**300 Revolutions.

PUMPING STATION AND GROUNDS

The general work of improvement to the grounds around the pumping station was carried on throughout the year, and some progress made in filling in some of the canals at the westerly end of the grounds. On account of war conditions it was deemed advisable to guard the stations and the grounds have been fenced in and visitors excluded from the immediate vicinity of the station.

The work on the eight feet diameter tunnel to connect the new station, was completed to within about twenty feet of the connecting end when work was suspended, owing to the inability to obtain the 72 inch gates for the connection to the water gallery; as soon as these gates are received and set, the remaining portion of the tunnel will be completed.

Contracts were let on December 26, 1916 to the Worthington Pump and Machinery Co. (Snow-Holly Works) for two 37,000,000 gallon vertical triple expansion pumping engines at a cost of $418,250.00 for the two engines. These pumps will have a maximum capacity of 40,000,000 gallons each, and will be set in the new pumping station. The foundations for these pumping engines have been completed and the work on the construction of the engines is progressing satisfactorily at the Snow-Holly Works at Buffalo.

An ice fender around the intake crib, as recommended in last year's report was constructed during the past season, and apparently it accomplished the desired results, as no inconvenience was experienced last winter from ice clogging the ports.

NEW AND PROPOSED WORK

The work on the proposed extension of 48 inch mains from the pumping station to the northwesterly section of the city, as recommended in the last annual Report, has progressed to the extent of contracting for all of the necessary pipe, part of which has been received and distributed, but actual work of construction has been confined to the extension of the 36 inch main on Twelfth Street and Ford Highway, and to a portion of the 42 inch line in Dequindre Street.

The recommendations submitted last year regarding additional coal storage facilities; on improvements to the Settling Basin, still hold good, but it was found impossible to commence this work during the present year. In connection with the proposed coal storage facilities, I would recommend the installation of a new unloading derrick, and improvements to the coal conveying devices.

Attention is directed to the table of statistics appended hereto, in form recommended by the New England Water Works Association, which gives in concise form the general data regarding the Water Works System.

In conclusion I wish to express my appreciation to the President, and Members of the Board, and to all the officers of the Board for their continued assistance and co-operation in carrying out the work.

Very respectfully,
THEODORE A. LEISEN.
General Superintendent.

SUMMARY OF STATISTICS

In form recommended by the New England Water Works Association.

Detroit Water Works,
Detroit, Wayne County, Michigan.

GENERAL STATISTICS

Population by United States Census of 1910, 465,766.
Date of construction, 1827.
By whom owned. The Board of Water Commissioners of the City of Detroit.
Source of supply, Detroit River, near Lake St. Clair.
Mode of supply, pumping.

PUMPING STATISTICS

Builders of pumping machinery—

One 24,000,000 gallon, Compound Beam, Detroit Locomotive Works, Detroit, Michigan.
One 24,000,000 gallon, Compound Beam, Riverside Engine Works, Detroit, Michigan.
One 30,000,000 gallon, Compound Beam, Riverside Engine Works, Detroit, Michigan.
One 24,000,000 gallon, Triple Expansion, E. P. Allis & Co., Milwaukee, Wis.
Two 25,000,000 gallon, Triple Expansion, Allis Chalmers Co., Milwaukee, Wis.
One 25,000,000 gallon, Triple Expansion, Holly Mfg. Co., Buffalo, N. Y.
Three 30,000,000 gallon, Triple Expansion, Bethlehem Steel Co., South Bethlehem, Pa.

Description of fuel used—

a. Kind, bituminous, run of mine.
b. Brand of coal. Meadowbrook, W. Va.
c. Average price of coal, per gross ton (2,240 lbs.) delivered at Water Works $3.64
d. Percentage of ash, from Laboratory Analyses 9.16%
e. Wood, price per cord, none used.

Coal consumed for the year, 54,604,010 lbs.
Amount of other fuel used, none.

Total pumping for the year—

High Service	13,765,140,500 gallons
Low Service	38,275,113,750 gallons
Total	52,040,254,250 gallons

An allowance of 3% slip for all engines has been made in these quantities, and they represent the actual metered consumption.

Average static head against which pumps work—

High Service	65.0 lbs.	150.0 ft.
Low Service	49.1 lbs.	113.3 ft.
Whole System	54.3 lbs.	125.3 ft.

Number of gallons pumped per pound of equivalent coal, 953.

$$\text{Duty} = \frac{\text{Gallons pumped x 8.34 (lbs.) x 100 x dynamic head}}{\text{Total Fuel Consumed.}} = 99{,}600{,}000$$

Cost of pumping, figured on pumping station expenses, $181,539.91.
Per million gallons pumped, $3.49.
Per million raised one foot (dynamic), $.028.

STATISTICS OF CONSUMPTION OF WATER

Estimated total population at date (City of Detroit)	808,327
Estimated population on lines of pipes	861,427
Estimated population supplied	861,427
Total consumption for the year	52,040,254,250 gallons
Passed through meters	29,509,010,557 gallons
Percentage of consumption metered	56.7%
Average daily consumption	142,576,039 gallons
Gallons per day to each inhabitant	165.5
Gallon per day to each consumer	165.5
Gallons per day to each tap	991
Cost of supplying water, per million gallons, figured on total maintenance	$7.56
Total cost of supplying water, per million gallons, figured on total maintenance plus interest on bonds	$8.96

STATISTICS RELATING TO DISTRIBUTION SYSTEM

Mains

Kind of pipe, cast iron.
Sizes, from 2-inch to 48-inch.

Extended during year	271,416 feet	51.4 miles
Discontinued during year	6,414 feet	1.21 miles
Total now in use	5,552,072 feet	1051.53 miles
Cost of repairs per mile		$5.36
Number of leaks per mile		0.19
Length of pipes less than 4 inches diameter		10.11 miles
Number of hydrants (public) added during the year		356
Number of hydrants (public) now in use		7420 and 205 H. P.
Number of cisterns now is use		516
Capacity of cisterns		3,772,000 gallons
Number of stop gates added during the year		447
Number of stop gates now in use		11,519
Number of blow-offs		920
Number of stop gates smaller than 4 inch		27

Range of pressure on mains, 16 lbs. to 65 lbs.

SERVICES

Kind of pipe, lead and cast iron.
Sizes, ⅝ inch to 12-inch.

Number of service taps added during year	11,868
Number now in use	143,898
Average length of service, approximately 30 feet.	
Numbers of meters added	18,551
Number now in use	65,542
Percentage of services metered	46%
Percentage of receipts from metered water	56.0%

FINANCIAL STATISTICS

RECEIPTS

Assessment rates	$ 520,432.76	
Meter rates	1,025,932.82	
Delinquent, etc	9,561.45	
Total from consumers		$1,555,927.03
Miscellaneous receipts	$ 168,376.86	
Interest	15,432.54	
		183,809.40
		$1,739,736.43

EXPENDITURES

Water Works Maintenance—		
Operation, management and repairs	$ 565,119.53	
Interest on bonds	72,845.00	
	$ 637,964.53	
Depreciation account	174,643.75	
		$ 812,608.28
Balance		$ 927,128.15

Disposition of balance, devoted to construction work—

Valuation of works	$13,659,089.45
Value of real estate	867,029.18
Bonded debt	1,947,000.00
Amount of Sinking Fund	106,172.58
Average rate of interest	3½% plus